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THE GREEN LIGHT FOR PEACE

THE CASE FOR JAPAN

CONDITIONS IN SOVIET RUSSIA TO-DAY

Vol. XXXIV MAY, 1938 No. 5

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXXIV SHANGHAI, MAY, 1938 No. 5

The Green Light for Peace

AMERICA wants a peace in the Pacific that is enduring and permanent.

Not only is America anxious to accomplish this objective, but powerful thought trends in the nation to-day are vigorously striving to bring about the fulfillment of a Pacific policy by which amicable trade and diplomatic relations will continue and at the same time be permanently established among Asian countries and the United States.

If on the surface these statements appear anomalous with the American Government's request for passage of a record U.S.$800,000,000 armament program and a Navy "second to none" by sensationalism on the part of a certain block of the American press, consider then the strength of American public opinion against any manner of jingoism, and the forceful influence of the numerous organized peace groups.

With reference to the American "Big Navy" program, assuredly one factor in the minds of American Government leaders that has received scant publicity, but nevertheless is highly significant is a developing situation in the Republics of South America into which in recent times European influences, particularly Italian and German influences, have been thrust with ever increasing emphasis. How much the current naval program is related to this situation in South America and how much it is related to the situation in the Far East are questions that have special interest at this time.

During the last seven years, World Peaceways, one of the largest of the American peace organizations, has been bludgeoning home to the American public the importance of amity in the Pacific. It has flooded the country with literature, hammered the thought at radio listeners often and extensively. Countless other groups whose purposes are anti-war, whether in the Pacific or elsewhere, have been educating citizens, by means of posters and literature, as to the folly of being an accessory to the continuing chaos in the Orient. That their work has been fruitful is borne out in a recent poll of the American Institute of Public Opinion, one of the world's largest and most accurate "thought-gathering" organizations.

Here is what the Public Opinion Institute found out:

Favor Withdrawing from China

That a great majority of Americans favor a policy of withdrawing United States citizens from China, particularly in war areas; that the Government should seek to withdraw American gunboats and marines from China stations.

The Institute asked representative voters in a nation-wide poll:

> "Which policy should the Government follow with regard to American citizens in China: (1) warn them to leave and withdraw our soldiers and naval forces, or (2) continue to maintain the present armed forces in China for their protection?"

Seventy per cent of the voters interviewed said they favored a policy of withdrawal. The remaining 30 per cent said they favored a policy of maintaining present forces. Both questions—the question of American civilians and the question of American armed forces—were dramatically posed for public opinion several months ago when Japanese bombers sank the U.S.S. *Panay* at a time when it was virtually a floating Embassy of the United States. At that time Secretary of State Cordell Hull declared the Government had long desired to withdraw troops and vessels when possible. It was not long after Hull's statement that the American Army post at Tientsin was permanently abandoned.

Sentiment in Congress followed the course of Hull's statement. A typical comment was that of Representative Hamilton Fish (Republican), New York, who told a national radio audience he had repeatedly urged withdrawal of gunboats and armed forces from China, but that he did not believe "in withdrawing one single American gunboat or soldier from China while under fire or as a result of threats or coercion." However, with the *Panay* incident wiped off the books with all but the forthcoming financial settlement by the Japanese Government, American sentiment is clearly in favor of avoiding additional incidents which might become causes of war for the United States.

American Investment Small

To the average American, China, 6,000 miles away, is of small consequence compared to his own problems at hand—unemployment and a new economic recession. Small to him, too, is America's comparative small business investment of U.S.$155,000,000. He also considers that the American who chooses to remain and who has returned after being evacuated last fall, should remain at his own risk. This is a policy that differs sharply from the official American position in the 1920's. President Coolidge declared that the "person and property of a citizen are part of the general domain of the nation, even when abroad."

But to-day the United States has withdrawn from Nicaragua, Haiti and Cuba, and it plans to withdraw from the Philippines, if the Filipinos don't change their minds again. That the sentiment for withdrawal is not merely a mood of the moment is shown in an earlier Institute survey, conducted before the bombing of the *Panay*. This poll of opinion revealed that 54 per cent of the voters thought American forces should be recalled from China.

The most recent poll of American attitude on the Far Eastern question shows how sentiment has increased. Greatest sentiment for withdrawal comes from the Middle West and South, reaching a ratio of more than 3 to 1 in the eight States, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota and South Dakota. The vote:

	Withdraw	*Stay*
New England States	64%	36%
Middle Atlantic States	65	35
East Central States	71	29
West Central States	77	23
Southern States	74	26
Rocky Mountain States	66	34
Pacific Coast States	65	35

There was a more recent and equally important display of anti-war sentiment when the so-called Ludlow Resolution was placed before Congress. The Ludlow Resolution called for a constitutional amendment which would have placed the power to declare war in the hands of the people. In other words, a direct vote of all citizens would be needed before the President and Congress could act. The resolution was supported by the Hearst press and a militant minority of the peace organizations. As a result, Congress received one of the greatest floods of letters and telegrams in its history, the majority of which clamored for passage of the resolution. However, the White House and the State Department saw it as a dangerous piece of legislation and immediately exerted every effort to defeat it. To their support came the Secretary of War, Secretary of State, the former Secretary of State, Henry L. Stimson, Alfred Landon, the Republican 1936 candidate for President, and President Franklin D. Roosevelt. Yet, with this array of imposing figures, each one important enough to crystallize public thought to a degree, the Administration was able to defeat the proposal by a margin of only 21 votes.

The Ludlow Resolution was defeated, but American public opinion was not. So considerable a show of strength in the face of such formidable opposition was a vindication. It was an indication that the peace movement in the United States is better organized and more militant than ever before. It told the world, especially those who live on the Pacific Rim, that Americans do not want war—only a continuance of peaceful relations. It revealed, too, that peace organizations are growing in America. The National Peace Conference has under its wing 40 participating organizations. There are probably 20 more which find the program of the National Peace Conference too conservative or not conservative enough. Roughly, then, there are 60 groups devoted to the task of manufacturing peace. Competent authorities say that this movement contains the largest number of organizations devoted to a single reform in the whole history of crusades for moral improvement. But these 60 organizations do not tell the complete story. Many of them serve as peace agents for affiliated bodies. The Department of International Justice and Goodwill of the Federated Council of the Churches of Christ in America is the peace representative for 23 Protestant denominations. The National Council for the Prevention of War are agents for 32 national organizations which have peace as one of their primary aims. The National Conference on the Cause and Cure of War harbors 11 groups who are not listed among the sixty. The total membership of the 11 affiliates is said to be more than 6,000,000, while the League for Peace and Democracy, formerly the League Against War and Fascism, claims the right to speak on peace for more than 4,000,000.

Peace Movement Grows

Month by month the peace movement grows. Even a certain section of the press has begun to tone down its sensational outbursts, treating the Far Eastern problem more intelligently. In the organized peace groups progress is constantly being made through the establishment of local and subsidiary organizations. By the end of this year the National Peace Conference expects to have in operation peace councils in numerous towns and cities. The League of Nations Association has 23 branches in 18 States, while the Foreign Policy Association is directing 17 branches. The National Council for the Prevention of War has regional offices and more than 100 locals; the Women's International League for Peace and Freedom likewise has more than 100 offices, while the United Student Peace Committee has representatives on several hundred campuses. In more than 2,000 communities the Emergency Peace Campaign is operating 20 regional offices.

There is no doubt that the peace movement in the United States has changed the American's attitude in regard to his nation's policy in dealing with world problems—the Far Eastern situation in particular. The American has never been an overly-belligerent individual, anyway. True, there are times in American history when, under a Theodore Rooseveltian policy, he did try to wave a "big stick." But, intrinsically, he likes peace. And he'll meet you more than half way to obtain it. But this peace movement has made further dents in his conscience. A majority of the leading Protestant denominations of America have branded war as a sin and included peace as a major item in their social gospel. Others who have fallen into this manner of attack upon the American's conscience are the Central Conference of American Rabbis, the Catholic Association for International Peace, the General Federation of Women's Clubs, the Y.W.C.A., the League of Women Voters, the National Federation of Business and Professional Women's Clubs, and the Women's Christian Temperance Union. And within and outside of these and other organizations, an anti-war opinion has been built up in the United States, the vastness of which has never been clearly revealed merely because, up to the present, it has never been united. There can be no question of its colossal powers once it unites.

Influence on Government

This fact is recognized by the peace leaders spurring them on to bring about a united front as soon as possible. Unity already achieved has been taken cognizance of by the Government leaders, who are wondering if the influence of such a movement, if carried to extremes, might not deprive the United States of its influence as a world power and thus rob it of its opportunity to serve the cause of world peace. But, as the momentum of the movement increases, it appears likely that the White House and the State Department will be held answerable to the peace groups.

There have been no decisive victories for the peace movement won as yet; but, as the thought continues to spread throughout the country—as the clamor for peace grows more insistent—a victory, if one may hazard a guess, should not be very far in the future.

These are the factors, and this is the tremendous force of public viewpoint that give expression to the underlying sentiment and to the aspirations of the American people. It is a simple manifestation of good-neighborliness, an opinion that is well aware of the fortunate place the United States holds among nations of the world, and aware, and sympathetic also, that other nations are less well endowed.

It must be remembered, though, that this national abhorrence of conflict and this great urge for harmonious world relationships does not and cannot mean any stand for "peace at any price." The American desire and hope is for a peace consistent with the honor, the dignity, and with the traditions of the American Government. With regard to these factors dollars and cents mean exactly nothing at all in the American's inner consciousness, and should these fundamental things be ignored or trampled upon, inevitable results follow swiftly and certainly.

The American attitude toward foreign relationships is such that, characteristically, it wears a smile, but it has within itself a capability for most abrupt transformation, if provocative causes are given. History portrays this American temperment in clear sequence. These great pacific forces in the United States so zealously striving toward an objective to-day can be turned about-face overnight. This has happened before, and when such changes take place, against the will of the American people, having been thrust upon them, the march to arms is irresistible and cannot be halted.

Certain important facts, long overlooked, are being more and more recognized by Americans, although anti-Japanese opinion continues to be the mood of the moment in a minor way, mainly because the Japanese are such notoriously poor propagandists. If Japan knew the simple every-day garden variety of publicity tricks she could have halted the wave of anti-Japanism in America virtually before it started. There is no subtlety about Japan's propaganda. The naiveté of much of their stuff strikes the average American rather forcibly. Japan equivocates when she should tell the simple truth; tells the truth when she should equivocate. However, we are deviating from the subject at hand. What Americans are beginning to learn is this:

(1) That not a dollar can be lent west of Honolulu to-day without inviting enmity in some quarter.

(2) Japanese have displayed a good record in repaying every penny on schedule; Japan is the only world power that has not defaulted in any respect. But should we risk further loans for her development of China?

(3) Japan did not cite what they borrowed as greedy Wall Street exploitation, penetration, imperialism.

(4) Japan is anxious to be a friendly neighbor to the United States; of course, her reasons for friendliness may be for purely financial reasons; nevertheless, she is showing an honest attempt to be neighborly (The *Panay* incident is forgiven).

Way Clear for Power Advance

Another matter which Americans must realize sooner or later is that the Japanese are strategically and temperamentally and

(Continued on page 167)

The Case for Japan

By HERBERT H. GOWEN, D.D.

[Herein is presented, in condensed form, a record of recent events in China based on an address that was delivered on October 25 last before the Monday Club of Seattle, Washington. Herbert H. Gowen, D.D., F.R.G.S., F.R.A.S., the distinguished author, is Professor of Oriental Studies at the University of Washington at Seattle, and Honorary Fellow of St. Augustine's College, Canterbury, England, as well as author of a number of authoritative works dealing with Far Eastern affairs, among them " An Outline History of Japan," " The History of Indian Literature," " A History of Religion," etc.]

* * *

I WRITE this paper not only with diffidence and humility, but with profound sadness—a sadness bred of disappointment and disillusion. Public opinion, with apparently small regard for facts, or small desire to seek them, has seen in the present conflict in the Far East just another example of Japanese aggression.

That public opinion has also, out of long habit, been totally blind to the huge military machine which foreign assistance (not exclusively Russian) and foreign sympathy (quite largely American) made it possible for China to call into the field. The League of Nations has found itself unable to distinguish between its function as an instrument for the securing of even-handed justice for all nations, including the " have-nots " as well as the " haves," and that of protecting the vested rights (however acquired) of certain European nations, especially those in the Far East.

And our own America, which so decisively repudiated the League and its works, and protested so feelingly its intention to remain deaf to all the blandishments of propaganda and blind to all the seductions of foreign flirtations, has proved, alas! as credulous as of yore and as ready to be stampeded down the steep and slippery way which leads to war.

I shall limit my survey in the main to events which have taken place since the Shanghai Agreement of May 5, 1932, known as the Tangku Truce, signed by China and Japan in the spring of 1933. There are, however, two anomalies which it is necessary to mention. They are intimately related to the present situation and without doubt have colored the opinions of a great many who are ignorant of history.

History of the Foreign Settlements

The first of these anomalies is in the existence of what is known as the Foreign Settlements in Shanghai. The history of these goes back as far as 1843, when an area of 138 acres, purely British, was set apart in order that foreign merchants and their families might not interfere with the habits and customs of the Chinese population. In 1848 the area of the Settlements was extended to 470 acres, occupied by a hundred representatives of 24 separate firms. At a still later date, 1854, an American and a French Settlement were established on similar lines, but ten years later the American Concession was amalgamated with the British, under a single Municipal Council, while amalgamation was declined by the French Government. So the French Concession, so-called, was organized as a separate jurisdiction.

In 1899 the International Settlement was again extended, this time to embrace 5,584 acres, and, subsequently, the Council was enlarged by the election of Japanese as well as British and American representatives of the tax-payers. The Chinese were at first excluded from residence, as well as representation, within the Settlement. They began, however, to flock in at the time of the Taiping Rebellion and have since so appreciated the advantage of foreign sanitation and foreign security as to increase their numbers to something approaching the million. Many of these Chinese in course of time became tax-payers, but their demand for representation was until a decade ago resisted.

At present the total representation comprises five British, two American, two Japanese and (since 1930) five Chinese. It was in 1928 that the Chinese were awarded three representatives for the first time. From the very beginning it was decided that no Chinese armed forces should be permitted to enter the Settlement area or to menace the Settlement boundaries.

In 1854 (April) an incident occurred which has some bearing upon the present situation. The Chinese Imperial Army camped on the northern boundary of the Settlement, and the British Consul, Rutherford (afterwards Sir Rutherford) Alcock, demanded its retirement. On receiving a refusal the Consul used the Settlement troops to fight what is known as the Battle of Muddy Flat, in which the Chinese were forced to withdraw. Like action was taken by the Settlement forces in 1925, when 10,000 Chinese soldiers surrendered and were disarmed ; in 1927 ; and, by the Japanese alone, in 1932.

It will be obvious that in all this we have an anomaly such as could exist nowhere else save in China ; but history is history, and this particular piece of history must be taken into consideration in evaluating the significance of the attack made *upon* the Japanese of the Settlement on August 14 of this year. The 4,000 Japanese marines in Shanghai at that date were not invaders, but present in pursuance of treaty rights and of the necessity of guarding from violence 30,000 of their nationals.

Foreign Troops in North China

The second anomaly is in the presence of foreign troops, including Japanese, in North China. For the explanation of this we have to go back to the days of the Boxer Revolt and the Treaty which followed the suppression of that particular manifestation of anti-foreignism. In order that the way to the coast should never again be barred to foreigners resident in Peking, Great Britain, the United States, Italy, Belgium and Japan were charged with the responsibility of maintaining a certain number of troops, proportionate to the number of each resident nationality, at different points along the corridor from Peking to Tientsin.

For the past 37 years these Powers, with the exception of Belgium, have kept their garrisons at Peiping, Tientsin, Shanhaikwan, Chinwangtao, Tangku and other places. It is in line with the permission given to the warships of Great Britain, the United States, Italy and Japan to patrol the waters of the Yangtze for 1,500 miles from the sea and to station marines at certain ports.

It is all an anomaly, but one sanctioned by generally recognized treaties without which, as at Nanking in 1927, " when war-mad troops attacked foreign residents and entered the city with the definite license, if not intention, to rob and kill foreigners," much loss of life must at various times have resulted.

Having now drawn attention to these anomalies, I am under the necessity, before giving my factual summary of recent events, of making some rather general remarks as to the respective policies of Japan and China during the past two years.

First, let us ask what has been the general trend of Japanese policy, so far as China is concerned, during these years. In spite of general opinion to the contrary, I am thoroughly convinced that since 1933 Japanese policy has not been in the direction of aggression or of a developing militarism. Koki Hirota, both as Foreign Minister and as Premier, has repeatedly gone out of his way to be conciliatory to China, and has repudiated the likelihood of war during his terms of office. To Mr. Hirota's sincerity both the Chinese Ambassador to Tokyo and Chiang Kai-shek himself have more than once borne testimony.

The choice of Prince Fuminaro Konoye to be Prime Minister united all sections of opinion in the nation, and the Japanese parties have closed all the gaps between in support of the national policy. This choice was accompanied by the return of Hirota to the Foreign Office and a renewal of his pacific pledges.

Japan Planning for Peace

In the same period Japan, on the basis of her assurance of continued peace, has planned for the commemoration of the famous Charter Oath of 1868 in 1938, for the holding of an International Exposition in Tokyo in 1940 and for the holding of the Olympic Games in the same year. Furthermore, she has been giving the closest attention to the development of her foreign trade, with China as with other countries. It requires some stretch of the imagination to believe that she would by aggression in Shanghai deliberately proceed to wipe out that trade by the destruction of the huge investments she possesses in the industrial sections of that city.

Such has been Japan's general line of policy as it concerns China, though we must remember that in the same period of time she has been more than fearful of danger along the Russian frontier. The " incidents " of a provocative nature which have been more or less regularly occurring along the Manchoukuo and Siberian frontiers are amply sufficient to justify precautions taken by Japan in that direction.

At any rate the Empire has felt itself under the necessity not only of maintaining a large force within reach of the Soviet boundaries but also of cultivating the friendship of those countries like Germany and Italy which are themselves inimical to Russian propaganda. It may be conceded that democratic countries like our own and Great Britain would be slow to align themselves similarly ; and yet, were they in the presence of a menace equally dangerous, it might be that of two evils the choice of support from the Fascist side would prove the better for the future of civilization. Russia, working for world revolution, has never failed in the past to let down her allies and she can be depended upon to do the same in the future.

Now let us turn to the story of China since the signing of the Tangku Truce. For two years following this event notable progress was made towards the unification of China. The only obstacle to this unification came from the Communist elements in different parts of the country, notably in the north and west. Against these Chiang Kai-shek, assisted by a group of conciliatory ministers (later, for their efforts, branded as pro-Japanese), waged unremitting war and received from Japan only the friendliest co-operation, so far as she was permitted to aid. It was indeed for the equipping and maintaining of the armies despatched for the suppression of communism that Chiang Kai-shek was able to obtain those huge supplies of armament and munitions which the pacifically-minded altruism of the industrial West was so glad to manufacture and sell.

Affairs were at this stage when the Seventh International Congress of Soviets was held and made it a chief feature of its program to foment a new drive for the sovietization of China and for the promotion of war between China and Japan. Thereupon things began to happen in rapid sequence. First, in November, 1936, came the shooting by a reactionary of the conciliatory Acting Foreign Minister, Wang Ching-wei, who fortunately was not killed. But a few days after Wang's right-hand man, Tang Yu-jen, was assassinated, and reactionaries came in to fill the vacant places.

A month later, in December, 1936, Generalissimo Chiang Kai-shek was kidnapped by that somewhat tarnished patriot, Chang Hsueh-liang, who after his expulsion from Manchoukuo, carrying some $60,000,000 extorted from the exploited peasantry, had been sent abroad for his country's good, but had now returned to play his part in the revival of the fortunes of communism. A captive at Sian, Chiang was (according to the general account) given the alternative of war with Japan (together with the calling off of the anti-communist campaign) or death. We can only surmise as to the negotiations carried on through the medium of Madame Chiang Kai-shek and judge them by their results. For immediately afterwards, and without notice, we find the completest reversal of policy.

China Starts Anti-Japanese Activities

The operations against the communists ceased abruptly, and the face of the Chinese armies was turned towards the north and the Japanese garrisons. Instead of the old ministers, reactionaries hostile to Japan found a welcome at Nanking. The Russian militarist who helped raise Chiang Kai-shek to power in the old revolutionary days, General Vassili Bluecher, also known as Ga-Lin, is once more hovering behind the battle-fronts, lending his military genius. Other foreign military experts, at least thirty in number, who had learned the secrets of modern trench warfare on the battlefields of France and Flanders, proceeded to build their concrete redoubts, with wire-entanglements, sand-bags, and the like, right on the borders of the International Settlement adjacent to the Japanese residential section.

The *Blue-shirts* and other anti-Japanese societies recommenced their activities in the land. And the Primary Schools began again carrying out of their program of training the youth of the nation to hate. It was again :

> " Composition : Children shall be required to write anti-Japanese essays and verses. Penmanship : Children shall be required to copy anti-Japanese slogans. Drawing : Children shall be required to draw pictures representing atrocities committed by Japanese " ;

and so on through the entire curriculum.

Thus, while a credulous world was hailing the well-nigh accomplished unification of China as a modern miracle, men failed to see that the *unification was a unification of hate* and that the success of this kind of unification was merely the *success of red propaganda.* It was but a stage in a program which was intended to sweep away the one Power in Eastern Asia which had proved an obstacle to sovietization as a prelude to the main effort in the direction of world revolution of which Russia had never lost sight or touch.

So the stage was set for the incidents about to occur, and while the Generalissimo removed a restraining hand by going off on holiday at Kuling, where he hobnobbed with American missionaries, things began to happen.

I will mention first those which took place in the neighborhood of what are known as the demilitarized zones of the north, that is, the regions south of the Great Wall extending all the way from the borders of Inner Mongolia to the coast and north to Shanhaikwan. This region, as already mentioned, the Chinese had pledged themselves to respect.

On July 7, then, occurred what is known as the Lukouchiao affair, when, without provocation or previous warning, 150 Japanese soldiers, drilling on their accustomed drill-ground, were suddenly attacked by a portion of the 29th Route Army. The Japanese were unarmed but for one musket-ball apiece, and this in possession of the commanding officer, so had no alternative but to concentrate and send for reinforcements, when the assailing force was driven off. *There is no dispute as to this being the first clash.*

It should perhaps be added that at this time the total Japanese force in the Peiping area consisted of something over 4,000 men, there by treaty for the protection of their 16,000 scattered nationals. The other Powers had 4,449 troops for the protection of 10,338 of their own people.

Omitting several encounters on the days immediately succeeding July 7, encounters which were readily enough apologized for by the civil authorities, we come to the Langfang incident of July 23, when, after notice given, a party of Japanese signal corps men, sent to repair a cut telegraph wire, were attacked by an entire regiment of Chinese with machine-guns and hand-grenades, and only escaped annihilation through the timely arrival of reinforcements.

Thirdly, on July 28 occurred the Kuangan-men affair, at one of the wall-gates of Peiping, when a number of Japanese belonging to the garrison, on their way to barracks, with the knowledge and permission of the Chinese authorities, found themselves suddenly trapped by the clanging-to of the outer gate and attacked with guns and grenades. The men cut off only saved themselves from extermination by the forcible opening of the gate, after serious loss.

Fourthly, comes the attack of the 29th Route Army on Tientsin on the early morning of July 29. The attack was made at four different points, the Japanese barracks, the Japanese Concession, the Field, and the East Station. There was only a single Japanese company in the Concession, but, assisted by reinforcements, they succeeded in driving back their assailants.

So far there had been no retaliation on the part of the Japanese, though the Cabinet at Tokyo, seriously perturbed over the situation, was forced to consider the sending of military help to the North China garrison, just as in 1927, under circumstances of considerably less menace, the Treaty Powers had considered the sending of (and sent) their forces to Shanghai.

The next incident showed clearly enough the need for this help, and is one of the blackest spots in the entire story, though it has not attracted the sympathy of the world. This was the massacre at Tungchow, a city on the borders of the demilitarized zone, of several hundred Japanese civilians—men, women and children—murdered in cold blood, after torture and mutilations of an indescribable nature.

All through these incidents, it must be remembered, the local civil authorities showed themselves conciliatory and anxious to maintain the peace, but from the first it was equally obvious that the army was resolved on provoking war. Chiang Kai-shek expressly refused permission to the civil authority to conclude negotiations unless it was understood that the movements of the 29th Route Army were not in any wise to be hampered.

So the Communist armies, released from all pressure and free from any restraint, were now in full cry northwards. As many as 30 divisions, if we include the 29th Route Army, were on the move and (possibly to the surprise of those who insist that the Japanese, not the Chinese, have all along been the breakers of treaties) were treating the demilitarized zones as though the Tangku Truce had never been signed.

It was under these circumstances that the Cabinet of Prince Konoye deemed it necessary to send an expeditionary force to relieve the hard-pressed garrisons and to punish, not the Chinese people, but the Government which had over and over again broken faith with Japan. It is satisfactory to know that, with the sympathy of a great many Chinese in these regions, the five northern provinces are now in a fair way of being cleared of the presence of the Chinese armies.

Tension in Shanghai

Now let us turn south to the Shanghai area. In this region, apart from the few soldiers who were just enough to take their share in the internationai patrol, there were just 4,080 marines to protect 30,000 Japanese residents (one-half of the foreign population), while the British had 2,000 and the Americans 1,000 to protect a very much smaller contingent. It is inconceivable that the Japanese had any doubt as to the absolute inviolability of the International Settlement at this time, much less that they were themselves planning an attack whose first consequence would be the destruction of property in which they had invested millions of yen.

There had been a number of isolated cases of outrage stretching back to November 1935, but the first indication that trouble was actually at hand came when a Japanese naval officer, Lieut. Oyama, was slain a few hundred yards from the Shanghai aerodrome, together with his chauffeur, Saito. Oyama was shot and his body pierced with forty-one bayonet thrusts, surely an unnecessary piece of thoroughness.

The outrage, which caused a panic in the Japanese section of Shanghai, naturally led to an immediate increase in the number of Japanese war-craft in the Whangpoo,* while other Powers took, on a lesser scale, similar precautions. Steps in the direction of peace were taken by the Japanese Consul-General, Mr. Suemasa Okamoto, whom some will remember as a former Consul in Seattle.

On the same day as the Oyama murder Mr. Okamoto requested Mayor Yui to remove the sand-bags and other preparations for war which had been placed around the Japanese residential quarter and to withdraw the Chinese forces which had practically encircled the section. The Mayor agreed, but found himself powerless to carry out the agreement.

On August 12, at the request of Consul-General Okamoto, the Joint Committee of the Powers, which had been created on May 5, 1932, and included representatives of the United States, Great Britain, Italy and France, as well as of China and Japan, moved to stop the violation of the pact by the Chinese. The Committee met, recognized the situation, warned the Chinese of the consequences of their violation, but failed to secure any withdrawal. Mayor Yui refused to guarantee compliance and said the matter was one for settlement directly between China and Japan. The Japanese thereupon ordered all their nationals into the district for protection and posted guards.

The next day, August 13, the foreign ambassadors, not including the Japanese, held a mediation meeting. But even while their offer to mediate was being considered the Chinese regulars fired upon the Japanese, and these not unnaturally returned their fire. The result was a brief skirmish, during which the mediation meeting adjourned.

Chinese Attack Foreign Settlement

Then, on Saturday, August 14, without warning, Chinese bombers started to drop bombs on the International Settlement with terrible loss of Chinese civilian life at crowded corners of Nanking Road and Avenue Edward VII. Of the several hundred lives thus sacrified three were those of Americans, a tragedy which has apparently been forgotten. An editorial in the *North China Daily News* spoke of it as " A Tragical Début " which would do more harm to the cause of Chinese nationalism than months of diplomacy could remedy. But diplomacy was now put out of countenance. The bombs seemed to have been deliberately dropped on the International Settlement to bring the whole world into the fray, since both the Japanese Consulate and the flagship *Idzumo*, which were supposedly the objectives, were a long way from the spots actually bombed. Yet the whole incident seems to have passed out of the memory of a press bent upon making Japan the aggressor from first to last.

The following day an emergency conference of Consular representatives of all the Powers met and invited Mayor Yui of Shanghai to consider two points, namely: (1) The matter of restricting bombers from flying over the International Settlement; (2) The offer of a mediation attempt by the Consular Body.

To these points Japan replied: (1) Japan's policy now and previously had been to keep airships from flying over the International Settlement; (2) Japan will be happy to consider any mediation suggestions.

China's reply was: (1) The air over the Settlement is Chinese; (2) Any mediation effort which may result is bound to be disadvantageous to the Chinese, and we do not favor the suggestion.

So the Chinese, confident in their newly-acquired strength, renewed the attack on Japanese objectives. The Japanese now took the matter seriously and decided to do what the British had done as far back as 1854, and the Allied forces in 1925 and 1927, namely, to compel the retreat of the Chinese army beyond the lines into which they had of set purpose dug themselves in preparation for this very situation.

It must be remembered, too, that the Japanese were fighting against tremendous odds, both numerically and otherwise, and were obliged in self-defense to sacrifice millions and millions of yen in their factories and other buildings which went up in smoke.

Now it is obvious that it would be impossible, within the limits of a paper, to give any connected account of all the separate incidents which have taken place since that tragic day in August. Thousands of people, Chinese fugitives as well as foreign merchants, realized that day for the first time that the security of the International Settlement and the French Concession was but an illusion. That in itself marks the incident as ending a period which had begun as long ago as 1843.

But instead of commenting on the startling character of this revelation, one which immediately placed in jeopardy the vast investments of Great Britain in Shanghai, to say nothing of the property of other Powers, it is necessary to deal briefly with two important aspects of the situation: one the question of the bombing of civilians, the other that of propaganda and the falsification of news.

Regarding Aerial Bombings

On this first question it must, to begin with, not be forgotten that the bombing of civilians was commenced by Chinese and has since been continued by them. The horrible details of the Nanking Road massacre are in themselves sufficient to prove this. That there was no let-up in the practice is shown by the deliberate bombing, on August 30, of the *S.S. President Hoover*, with further loss of American life. That this was deliberate, and not an accident, is shown on the testimony of the ship's officers and that of eyewitnesses.

The bombing machine circled the vessel four times before releasing its deadly missiles, and had it not been for the arrival of Japanese assistance the ship would very likely have been sunk. This is affirmed by Mr. P. V. Reeves, of the staff of the High Commissioner of the Philippine Islands, who was a passenger. He adds to the account of what he calls " the wilful, wanton, merciless, inhuman, savage-like " attack on the ship the words: " China's claim that the bombing was an accident is contrary to all facts."

Moreover, as I have said, China continued the bombing of civilians. As recently as October 20 United States Ambassador Nelson Johnson " made written representations to the Chinese

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* The Japanese at this time, in line with their policy to do everything possible to avert incidents, at vast sacrifice of commercial interests had evacuated their nationals from centers on the Yangtze, taking their gunboats out of the river at the same time. Perforce, these warcraft had to disembark the hundreds of refugees from Yangtze valley centers at Shanghai for transfer to vessels proceeding to Japan, and the gunboats, having abandoned patrol of the Yangtze, had to remain, and were at Shanghai, with the result that in the train of later stirring events the charge was made that the Japanese had " sent a huge fleet to Shanghai " in preparation for the outbreaks that occurred.—ED.

Government asking that Chinese planes quit flying over the Shanghai International Settlement and dropping bombs in foreign areas. The Ambassador said previous Chinese assurances that planes would not fly over foreign areas had not been fulfilled."

In the next place one cannot but discern a certain element of hypocrisy in the protests of nations which are themselves largely responsible for the retention of bombing for warfare or for police purposes. At The Hague Conference of 1923 Japan herself pressed for the abolition of aerial warfare, but her proposals failed of adoption through the opposition of France and Great Britain. Great Britain has within a few months employed bombing for the destruction of civilian life in Waziristan. Russia has assembled a huge fleet of airplanes at Vladivostok for the express purpose, should war break out, of wiping out the commercial cities of Japan without distinction of military or civilian.

I fear that war from the air, necessarily destructive of civilian as well as of military objectives, is part of the technique which our so-called civilization has decided to accept. Under these circumstances it seems to me that Japan is justified in declaring:

> "So long as it is an accepted arm, and one employed by the adversary, Japan certainly cannot forego its use. And so long as railways, railway stations, barracks, arsenals and other structures in populous centers are universally ticketed as fit objects for attack—as indeed they logically must be—there must inevitably be grave risks incurred by all who live in the neighborhood."

In the third place it is not fair to overlook the explicit Japanese statement as to the reasons for using aircraft and for their method of employing them. The official statement of the Japanese Foreign Office runs as follows: "Since Nanking is the central base of the Chinese military operations, with unparalleled land-defenses, it is unavoidable for the purpose of attaining the military aims of the Japanese forces that the military airdromes and establishments located in and around Nanking should be bombed. The bombing operations of the Japanese forces are not carried on beyond the scope above mentioned. It seems necessary to say that they are not directed indiscriminately at non-combatants. The warning issued in advance to non-combatants serves as a testimony to the above statement."

And again: "Our request to the effect that officials and civilians who are nationals of your countries should take refuge is due to no other thought than our earnest desire to prevent any untoward misfortune befalling the nationals of third Powers, which it is their wish to respect to the greatest extent possible."

And furthermore: "Japanese aviators are under strict instructions to bomb objects of military significance only. There has been no case of ruthless bombing of civilian centers by Japanese flyers. Japanese flyers have been ordered to take every precaution for accuracy before releasing bombs, and many times Japanese airplanes have returned to their bases with their bombing racks still fully loaded because suitable military targets could not be approached closely enough to make bombing accurate. Charges of civilians, hospitals and schools being bombed are not true."

Eye-Witness Reports Prove Unreliable

To come to the question of propaganda and the falsification of news, it might have been supposed that after our experience in the Great War, when avowed eye-witnesses reported every imaginable fable, from the nailing of children's hands to doorways in Belgium to the passage of thousands of Russian troops through Great Britain, the public would have been just a little wary as to the news furnished by eye-witnesses. But it would seem that men are as gullible as ever.

I will repeat a quotation from the *Shanghai Evening Post and Mercury*, which no one will accuse of being pro-Japanese:

> "We have leaned backwards," says this editorial, "and the same is true of others, in striving to get and present the news from the Chinese side. But, in the first place, the Chinese afforded us little contact with authoritiative sources; in the second place they issued very little news on their own account; and in the third place they insulted the intelligence of any sane person with the atrocious fabrications they put in. Time after time of late the Chinese have indulged in the most bombastic claims of glorious advances into Hongkew. The Japanese gave the foreign press a chance to come in for discussion, denied these claims, and issued passes so that the correspondents could go and look for themselves. Seeing is believing. Detail after detail could be checked off the Chinese reports, and so far as local investigation within the Japanese lines could determine, most of all these Chinese reports were wrong. A great many foreigners and Chinese think that the Japanese merely hand out a pack of lies. They were never more mistaken. Correspondents at first tended to believe, but when their own eyes showed that they had been getting first-hand truth from the Japanese and second-hand fiction from the Chinese, well, figure it out for yourself."

In this connection it will be recalled that Mr. Hallett Abend, the correspondent for the *New York Times*, has quite recently himself protested to the Chinese against the doctoring of the text of his dispatches in such matters as the substitution here and there of the word "Japanese" for "Chinese" or the insertion of a convenient "not."

Should China Win—

If, in the present instance, China be so strongly supported by the stupidities of popular feeling and international diplomacy as to draw other nations into the conflict, including ourselves—who have been most voluble in the expression of our intention to remain neutral—China may win through the exhaustion of Japanese resources in men and money.

It would, however, from our point of view, be a Pyrrhic victory, the triumph of a Red Russia creating in turn a Red China, and removing the one barrier which at present exists in the Far East against world revolution. It would undo all that has been done in these last years in Manchoukuo and North China towards substituting law and order for the chaos of banditry. It would mark the end of European and American influence in the International Settlement of Shanghai. The Chinese, having made their breach in the foreign control of the great seaport, would not be slow to force British and French and Americans to follow the Japanese and make exclusion permanent.

Should Japan Win—

On the other hand, should Japan, by a supreme effort of national self-sacrifice, prove the possibility of weathering the storm and defeating the present Communist conspiracy which has forced the hand of Chiang Kai-shek, then the situation is by no means hopeless. Japan has absolutely denied any ambition to extend her territorial responsibility or to interfere with the foreign rights in Shanghai of which, by treaty, she possesses a share.

What she needs, and that to maintain her own existence, is obviously not additional territory, but freedom to carry on her industrial program with access to raw materials and unmenaced by the disorder, boycotts and anti-Japanese movements which have been due not to the general antipathy of the Chinese people, but to a propaganda fomented largely from without and which has now become for certain classes a form of hysteria.

In this case it may be predicted that Shanghai will speedily recover her place as the great emporium of Eastern Asia, with as much benefit to China herself as to the foreign firms which have there invested their money. As for the rest of China, North China will probably find its salvation in a separate autonomous state, while southern and western China will go their own ways. It will not be the first time in the history of China that the land has benefited by decentralisation rather than by an enforced and unnatural unification.

Which end will be reached I cannot, of course, venture to predict. The future is veiled in the thickest of mists. Some have even tended to adopt a kind of philosophic determinism, in affairs of nations as in affairs concerning the individual. As poor Othello was caught in the toils and dragged down to the ultimate tragedy by steps too undiscernible to afford warning or protection, so it may be with the history of nations. Dr. Latourette of Yale seems to have this in mind when he writes of the present course of events as they concern Japan as follows:

> "Can a case be made for Japan? Is it possible to give a reasonable defense for Japan's political and military imperialism on the continent of Asia? If one means by that a justification based upon some widely accepted standard of morals, a dogmatic 'Yes' or 'No' would be hard to defend. That way lie

endless debate, reciprocal recrimination and much confusion of issues. If, however, the case for Japan be approached historically, the answer must be an unqualified 'Yes.' When one comes to ask, in terms of the colloquial, 'How did Japan get that way?' one is startled to discover that about Japan's actions there has been much of inevitability. The still unfinished story of the modern foreign policy of Japan has a most sobering resemblance to some ancient Greek tragedy. Given the circumstances in which it is set, and certain initial deeds, the main outline of events seems almost predetermined. Only the most resolute action which no Japanese government could take and hope to survive can change the direction of a course which must lead either to much greater aggrandisement or to ruin. Present-day Japan and contemporary Japanese statesmanship are caught in a current of events for which they are only slightly responsible and whose direction they may modify but cannot basically alter."

However little I accept this statement in its entirety, and least of all any extreme doctrine of "manifest destiny," for Japan or for the United States, one must feel the force of the words quoted. But if we add to an expression of this the conviction that the doctrine of moral responsibility is not thereby nullified we will have to go further and acknowledge that the moral responsibility for the present situation is by no means so completely Japan's as to warrant the representatives of the Powers to sit complacently in the League Council and point a finger of a shocked and outraged righteousness to Japan as the aggressor.

Without attempting to forestall such a verdict it would appear even in the light we have to-day that China must bear her fair share of the responsibility. China, the spoiled darling of sentimental America, without real faith in westernism, without real sympathy for the western Powers to whom she appeals for aid, always ready to use force (and to boast of it) when she feels herself physically strong, and always ready to pose as a pacific people trodden down, abused and helpless, when she meets defeat, cannot forever evade an adverse verdict on the history of the past twenty-five years.

Russia, too, must appear at the bar for judgment, still nursing, even with Sovietism in the saddle, her dream of an Oriental imperialism, with ice-free ports on the Pacific, still intriguing for the break-up of the so-called capitalistic states, and in these last years bent upon provoking a Sino-Japanese clash as a curtain-raiser for the drama to come, still posing as the friend of democracy before a France and a Britain whom she would in the hour of crisis betray without compunction.

Other Powers, again, must answer to the indictment of having allowed their own economic interests to weigh so heavily against the principle of abstract justice that these interests need not be concealed even in the Council Chamber of the League—a League become almost confessedly an organization for the protection of the *status quo* and vested rights gained, sometimes by devious ways, in a past not so very remote.

And, lastly, we, the United States of America, have our own clear measure of responsibility. We brought Japan out into the arena of international life. We furnished the pattern by which Japan was to emerge from feudalism and in due course take her seat at the high table of international politics. We denied to the nation we had fostered the right of racial, political or economic equality. We showed little or no sympathy with her problems of over-population and industrial expansion. We shaped our laws to discriminate against her people and our tariffs to discriminate against her manufactures. We built up our armaments largely on the theory that here was the enemy against the menace of whose rivalry we must some day fight.

Short of some great act of repentance among all the peoples, we at least should see to it that we view her case dispassionately and without prejudice. Out of the passion and prejudice of the present, whether disguised as the belligerency of military and economic chauvinism or the belligerency of pacificism, can only come disaster and ruin for the civilization we have inherited.

Noted Japanese Educator Passes

A GREAT leader and educator was lost to Japan on March 26 last when Dr. Tameyuki Amano, L.L.D. passed away at the age of 79. As a writer and as a teacher, he was an outstanding personality, and his passing is an irreparable loss to Japan. Through the decade from 1897 to 1907 Dr. Amano was Editor of the parent journal of *The Oriental Economist*, published in Japanese.

After graduation from the Imperial University of Tokyo in 1889 Dr. Amano at once began the work that marked the beginning of his long and distinguished career. Under the sponsorship of the late Marquis Shigenobu, and aided by others who recognized his ripening talents and were his friends, he founded the institution that later was to become Waseda University. For many years he was a member of the Board of Trustees of this institution while at the same time serving as a member of the faculty. He was elected a member of the Diet in 1890.

In 1902 Dr. Amano founded the Waseda Business College and became its first Principal. He retained this position until his death. He was Chancellor of Waseda University from 1915 to 1917 and through various periods he was honorary member of the Tokyo Chamber of Commerce, and lecturer on economics at the Tokyo Higher Commercial School (now the Tokyo University of Commerce), the Army and Navy Intendant Schools, the Peers' School and other institutions of learning. Through these years of intense activity in giving valuable service for the advancement of education in his country he found time to act as Editor of *The Oriental Economist*. How indelibly he has left his mark on his times may be seen from the fact that the majority of scholars in economics who won distinction through the Meiji and the Taisho eras—1868-1921—were at one time or another his pupils, either in his class rooms or through his written works.

Probably the most significant chapter in Dr. Amano's life story was written when he was in charge of *The Oriental Economist* as its Editor. These were the years just after Japan had emerged as victor from the wars with China and with Russia, and when the foundations for Japan's vast industrial development along modern lines were laid. Through this memorable epoch Dr. Amano exerted a powerful personal force and influence as an editor, discussing in the columns of his journal with keen insight and sharp clarity of vision important questions of the day. He contributed much toward moulding a virile public opinion and very often in this period the Government's policies were swayed by the opinions he presented. It will be no simple task to fill the place in the educational life of the nation that he occupied.

The Green Light for Peace

(Continued from page 162)

economically equipped to realize on Asiatic investments in a way America cannot match and in a way no European power can match. If the United States wishes to improve their competitive position with Japan, the answer lies in the adjustment of their internal economy. There is nothing diplomacy can do about that. Obviously each country can produce some things cheaper and better than some other country, and at the same time can buy certain things from abroad to better advantage than making them at home. That induces foreign trade. The prospects of selling are contingent upon buying. Neither national abilities nor national endowments of natural resources, however, are equalized the world over. In other words, there should be no wild scramble for the Asian market by either America or Japan. The present war in China eventually should give Japan the advantage of propinquity, but will probably create no sizeable difference in America's Oriental trade. There are certain things America can make and sell cheaper than Japan. And America will do just that.

And it is to be added that when reconstruction in China does begin as certainly it will begin, perhaps even before the present conflict comes to an end, an immense market will begin to be opened and a demand will be created for materials, equipment and goods of every description that Japan with all her industrial resources and with her other advantages will be unable to supply.

One fact stands out in this muddle of world politics to-day: the green light is on for the advance of a world power in Eastern Asia. Circumstances name Japan as that power. The outcome will make fine reading for our history students of to-morrow.

Conditions in Soviet Russia To-day

By KATSUJI FUSE in the "Osaka Mainichi"

EDITOR'S NOTE: *Katsuji Fuse, the author of this article, is not only the greatest living authority in Japan on the U.S.S.R., but is unquestionably one of the foremost commentators on the Soviets in the world to-day. His articles on the Soviet Union and Soviet leaders are read with intense interest in Europe and America, to say nothing of the Soviet Union.*

A serial by Mr. Fuse on the Soviet Union once created such a furore that Karl Radek, leading Soviet commentator (now serving a 10-year prison term for conspircy), wrote a reply to it.

Mr. Fuse is one of the few foreign correspondents who have succeeded in interviewing Josef Stalin. Stalin, at the time he received Mr. Fuse, declared "I too am an Oriental" and that he was proud of his Asiatic blood.

Early last summer, shortly after the Tukhachevsky case, Mr. Fuse was ordered to the Soviet Union by the "Osaka Mainichi" and the "Tokyo Nichi Nichi." Following a thorough survey of the Soviet situation, he has been touring through the Baltic States and other neighboring countries of the Soviet Union, and by means of all the available data, old and new, he has been diagnosing the Soviet ills and pains from without. The cablegram below is his latest contribution.

* * *

WHY has the U.S.S.R., boasting of the world's largest army and air force, failed to extend aid to Lithuania, moaning under pressure from Poland? What makes her show indications of abandoning the Spanish Red army, about to be crushed by the nationalist régime under General Francisco Franco? The Moscow trial in March has given us a valuable hint as to the answer to these questions.

The Kremlin displayed the greatest concern in its attempt to show all the oppositionist leaders to be guilty of high treason. Yet the espionage frame-ups betrayed their futility one after another. All the defendants, however, admitted that they had been involved in plots to overthrow the Stalin régime.

The Kremlin's attempt to brand its political adversaries as traitors to their country in public trials has resulted in the self-exposure of the "Socialistic Fatherland." Involved in the intrigue were Soviet cabinet members, OGPU dignitaries, ambassadors and ministers, and military and civil authorities.

The hardest blow to the Kremlin was the revelation that the opposition faction within the army was plotting an armed uprising and that the small republics formed by minor races within the Union were launching independence movements. These two facts bid fair to prove fatal to the Stalin régime.

With respect to the motive behind the Tukhachevsky case, opinion among students of the U.S.S.R. was until recently divided. Some advanced the theory of armed uprising, while others asserted that insistence on military education first and last was the cause.

The latest trial substantiated the armed uprising theory and tore to shreds that concerning military education.

Army Intrigue

What, then, was the intrigue by Marshal Tukhachevsky and his associates? They plotted to storm the Kremlin and to eliminate Stalin and all members of the Politbureau.

The reason was obvious. Tukhachevsky himself was a bonapartist. He and his confederates were directed from behind by the Trotzkyists. The testimony by Karl Radek revealed to the Kremlin leaders the existence of the plot.

These facts tally with those reported to the two sister papers immediately after the case was disclosed. Later developments bear out the truth of my earlier reports, and I see no necessity of altering one particle to-day. The only thing is that rather a significant fact has been established as the cause of the failure of the intrigue.

That is, the Trotzkyists, upon opening the anti-Stalin intrigue, made it a prerequisite that the U.S.S.R. should wage war on Japan and Germany.

They knew that the Stalin régime is formidable and could hardly be overthrown by ordinary procedure. They reasoned that if the plot were to be organized during a war with a strong foreign power or powers, they would be sure to succeed.

Considering the fact that the October revolution was successfully executed during the World War, one need not wonder at the calculations by the Trotzkyists. Men like Tomsky are said to have contended that when it came to a showdown even the battle-front might as well be given up, knowing that a war with a strong power abroad was not the true purpose of their plot.

In order to start an armed conflict, they found it necessary to take high army commanders into confidence. Accordingly they brought Uvolevitch and Jakil in the picture. Furthermore, the intended armed uprising attracted anti-Stalin leaders of all descriptions, including Yagoda, former chief of the OGPU.

It is hard to estimate how near the eruption point the Soviet volcano has been in the last few years.

But when an intrigue assumes enormous dimensions, it runs a growing risk of being exposed. Besides, the great war which these men desired as the prerequisite of their plot showed no signs of coming. Their confidants were being rounded up right and left, and banking on war was a case of counting chickens before they were hatched.

Becoming impatient, they tried to execute their scheme in a "now-or-never" spirit about a year ago last March.

It was too late then. Already, Tukhachevsky had been surrounded by OGPU men.

Gross Miscalculation

It was a gross miscalculation by the Trotzkyists to depend on that which was an uncertainty at best—a war with a foreign country. Stalin proved a more gifted artist. He refused to swallow the bait flung, avoiding war throughout.

Nevertheless, the Kremlin stood aghast at the intrigue when it was bared. Arrests, trials, executions by firing squads in wholesale fashion were carried out in rapid succession. The iron hand with which Stalin ruled the situation dwarfed the despotism of Ivan the Terrible. It was a costly catharsis for the Red Army. Marshal Klementi E. Voroshilov, defense commissar, lost his six assistants within a year.

Tukhachevsky was shot dead. Gamarnik committed suicide. Arknis, Orlov, and Victrov are now serving prison terms. Egorov has been demoted to a provincial post.

Stalin has placed Mefris and Fediko in positions of trust and responsibility.

Mefris has long served as Stalin's personal secretary. He is said to have been appointed the political defense commissar not only for strengthening the Soviet political structure but for destroying the Voroshilov clique from the root. The Voroshilov clique in the past 12 years has wielded considerable influence within the Red Army, centering around the army and Semion Budenny's cavalry, 1st Army.

As soon as Mefris assumed his post, Egorov was shoved outside the ranks and sounded a warning to Budenny. This may be said to have hit the heart of the Voroshilov clique.

Among the army commanders placed under the surveillance of OGPU officials are Kasilin of North Caucasus, Dipinko of Leningrad, Belov of White Russia, Velikaf of Trans-Baikal, and Gailit of Ural.

In addition, men like Dobovui of Harikov, Inspector-General Bokis of the tank corps, Chief Sejakin of the air defense bureau, Sangrusky, vice-commander of the Far Eastern Red Army and proxy of Bluecher, Rapin, and Tzjisa have been taken into custody.

The catharis of the navy has been even more drastic. Admirals Orlov and Viktrov, two mainstays of the Soviet navy, have been ousted from their positions of assistant commissars. Admiral Luzri, commander of the naval staff college, and Kierev, who replaced Viktrov as commander of the Pacific fleet, have been placed under surveillance.

Admiral Kazhonov, commander of the Black Sea fleet, was replaced by Smirnov and later by Sverdrovsky. Sverdrovsky lasted only three months. Doshenov, commander of the northern fleet, likewise held his post but a short time.

The recent 20th anniversary of the founding of the Red Army, instead of being elaborately celebrated, saw an unprecedentedly large-scale round-up of army officers. The unsuccessful attempt by Colonel Kovarenko and Major Nikolaiev and their associates to storm the Kremlin under cover of darkness apparently gave the authorities something to work on.

The officers serving in the central government, the graduates of the military staff college, and those who served as attachés abroad were the chief victims of the round-up.

Out of 4,000 officers from colonel to major, 2,000 have been cashiered or taken into custody.

Out of 18,000 officers ranging in rank from captain to sub-lieutenant in the White Russian army region alone, 9,742 have been eliminated, while in the Moscow army region 2,984 out of 4,000 have been removed from their posts.

As a result, the Red Army is acutely short of commanders, necessitating the swift promotion of young officers to replenish the supply. I have been told it is not unusual for a captain to be promoted to the rank of a colonel in one jump.

No matter how hard Mefris may try, he cannot very well exterminate the Tukhachevskyites, any more than the Soviet communists can eliminate the Trotzkyites.

In view of the fact that the plotters within the Red Army are working for a war in order to attain their ends, Stalin and his colleagues cannot relax their vigilance even for a moment. That is where the Stalin régime has its primary grief.

Provincial Unrest

The second sore spot revealed by the March trial was the independence movements launched by various small racial groups having their own small republics in the Soviet Union.

The Soviet policy toward the small groups within the Union is just the opposite of that pursued by Tsarist Russia. The Kremlin under Stalin has been doing its best to encourage the restoration of their cultures and the establishment of their own republics or autonomous systems. In short, it has been doing everything to win them over by benevolent administration.

Stalin, coming from a minority race himself, has prided himself on benevolence toward such races. As one of the authors of the Soviet constitution, he has laid special stress on kind treatment of the minority races and on their establishment of their own autonomous régimes.

The benevolent administration has been only superficial, however. In point of truth, Stalin has not neglected to implant the cellular system of communism within the minority races and to have their moves watched by OGPU men. Besides, upon the pretext of planned economy, Moscow has of late forced its collective farming system upon the minority races, compelling them to depend on the central government for sustenance, whether they like it or not.

For instance, the Kremlin ordered sugar beets and hemp to be cultivated in the Ukraine and tea to be grown in the Caucasus. As the result, these regions were forced to depend on Russia proper or western Siberia for their supply of grain. This accounts for the famine that developed in the Ukraine, the granary of Europe. The cutting of the food supply route is a favorite policy of the Kremlin.

Men like Cherviakov and Gorodet of the White Russian republic and Skripnik and Panas Lubchenko of the Ukraine government, all of whom committed suicide last year; men like Enkiedzhe and Karahan of the Caucasus, who were shot dead last fall; Khozhaev and Ikramov of Uzbek, tried this month, are conspicuous victims of the camouflaged benevolence of the Kremlin.

Such a paradoxical policy has aroused the racial consciousness of the minority races in the Union, which overruled their class consciousness, making it impossible for them to withstand the continued oppression, executed under the disguise of benevolence, and driving them to identify themselves with independence movements. This in turn made them join the anti-Stalin men and the Trotzkyists.

Even in the native place of Stalin all is not quiet. The anti-Stalin sentiment among the people in the Caucasus is said to have become strong. Several Red Army officers there have bolted to Turkish territory, carrying secret State documents with them. This goes to show the reaction to the high-handed Kremlin policy.

In connection with the independence movements the Kremlin has either compelled leaders to commit suicide or has shot them to death.

At the same time, the Kremlin has been bringing about the minority races' compulsory exodus to other parts of the Soviet Union. Farmers of the Ukraine were transferred to the Arctic shores and the Far East; the Galerians were ordered to settle in Yakutsk province; while the Buriat Mongols are being removed to the Ukraine in large numbers.

In connection with ideology, the Kremlin is now advocating the Greater Russia principle first and last, is checkmating the cultural movements among minority races, and is making the use of the Russian language compulsory. In short, the Kremlin is resuming Tsarist Russia's policy.

In the event Moscow keeps up its oppression of the minority races, they will display all the greater zeal for independence. The Austro-German anschluss, executed under the banner of the self-determination of races, has undoubtedly aroused profound racial consciousness among the minority races in the Soviet Union.

Suspicion, Doubts

The U.S.S.R. has a third grief, which is by no means slight.

The third source of trouble is the demoralization of the people, entailing the complete destruction of generally accepted moral discipline.

During my tour of Siberia last summer I obtained a copy of the "Bolshevik," a periodical specializing in articles on domestic and foreign policies. It carried the complete text of a speech made by Stalin before a conference of leaders of the Communist party held in the preceding March.

In his speech made on that occasion Stalin declared in part that the Trotzkyites in various disguises were conducting secret manœuvers throughout the country. After warning members of the Communist party, military officers, and civilian government officials to be on guard against the Trotzkyite influence, he ordered them to report any suspicious acts on the part of their associates.

Stalin has encouraged the system of submitting secret information to the government. Formerly, however, the system was enforced largely through agents of the OGPU. Now Stalin openly instructs the rank and file of Soviet society to imitate the secret police.

Consequently, the spiritual side of life among the Communists, military officers, and civilian government officials has been thrown into the worst confusion witnessed in Soviet history.

Stalin's encouragement of the secret information system has, in fact, resulted in the destruction of moral discipline, the court-martialling of innocent people, and the prevalence of fear among the public. Even the respect with which the people looked up to Stalin has been removed.

The Bolsheviki in Lenin's days were sincere and straightforward in their ideas, although rude in their acts. Placing full trust in their comrades, they never informed against them. In a word, they had a definite code of honor.

The situation has since changed. Under the order of Dictator Stalin, Communists, military officers, and civilian government officials have never hesitated to ostracize one another, submitting secret information against comrades, and even falsely accusing them.

Personal grudges have been satisfied by such means through the agents of OGPU.

The Soviet Union to-day lacks the ethical code which has been generally accepted in civilized countries in the East and West.

Mutual distrust has prevailed among the people of Soviet Russia during the last year. Those who fought for the cause of the October Revolution have been executed at the headquarters of the OGPU.

Several years ago, when the collective farm movement was faced with a deadlock, Stalin, before a congress of the Communist party, declared that the Union Soviet Communist party was the strongest political party in the world and that the Soviet government was the staunchest régime on the globe. If the collective farm drive could not progress smoothly with the support of such an influential party and government, the Dictator stated, the responsibility for the deadlock would be on the part of the Communists.

As his assertion then indicated, Stalin in those days was a man worthy of the name of leader of a nation.

His caliber as a statesman, however, has since dwindled. Alarmed by reports of attempted uprisings, many purely imaginary, he betrayed his weakness in the speech he made before a conference of leaders of the Communist party last March.

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China in 1937

(Based on reports from the American Commercial Attaché, Shanghai, appearing in Commerce Reports)

MOMENTOUS events divide the story of China during 1937 into two nearly exact halves. The first half of the year was characterized by prosperity and progress, the second half by disaster and destruction.

The beginning of the year carried over from the previous year favorable indications in practically every field relations with other countries seemed improved and more nearly stabilized. The beneficial effects of the currency stabilization inaugurated in November 1935 were being realized in new railway, highway, and other constructions of an economic character. Excellent harvests for two years in succession, combined with higher and more stable prices for farm commodities, provided the bases for better social and cultural conditions among China's masses. Foreign trade for the first half of the year showed an increase in imports of 30 per cent, by value, compared with the first half of the previous year, while exports gained 45 per cent.

Then almost over-night the picture changed. The incident of the Lu Kuo Chiao Bridge, in Hopei Province, on the night of July 7, marked the active outbreak of Sino-Japanese hostilities. By the end of the year Japan's military forces were in full control of the five provinces—Chahar, Hopei, Shansi, Suiyuan and Shantung—which comprise North China, and the whole area of the lower Yangtze River valley including Nanking, the capital. Shanghai, the port through which flows normally about 50 per cent of China's foreign trade, has been completely cut off from its hinterland, its industrial and trade activities all but paralyzed. Many of its foremost mercantile houses, both foreign and Chinese, which handled its commerce have been removed to Hongkong or Canton. In the North China area a provisional government of Chinese personnel under Japanese direction, was established early in 1938 and large reductions made in the Chinese Maritime Customs schedules on important import commodities.

Agriculture and Crops

Details are lacking for all areas covered by the disturbances in the latter half of the year. On the whole, 1937, however, compared favorably with normal years, although in certain sections the activities of hostile forces interfered with harvesting of the crops, while marketing of the yields was hampered by the disruption of the transportation lines. In Manchuria, which was not directly affected by military activities, agricultural prices were higher than normal.

For the coming season many Chinese farmers will plant for their own needs rather than for cash crops because of the situation in transportation and marketing facilities. It has been impossible in some areas to prepare land for the spring sowing. Exports of agricultural crops can hardly fail to be greatly restricted.

Industrial Activities

During the first seven months of 1937, Shanghai, China's premier industrial center, made considerable advances in modern industrial development, as indicated by the peak load of the Shanghai Power Co. which in early August reached 140,000 kilowatts. Destructive activities in the latter half of the year reduced its power load to 20,000 kilowatts. The majority of Shanghai's factories were destroyed or dismantled and because of the vulnerability of the area, Chinese authorities have announced a future policy of decentralization in industrial reconstruction so as to encourage a larger distribution of industrial development into other centers.

Next after Shanghai, Tsingtao suffered most seriously from the destruction of industrial plants, the majority of which were Japanese. Plans for the rehabilitation of these plants are reported as being under way. In the North China area generally, Japanese interests are understood to be planning economic reconstruction which envisions a plan for linking Manchuria and the North China provinces to Japan in an economic bloc. In Manchuria, a five year plan for industrial development was launched during 1937 which calls for investments aggregating 1,600,000,000 Manchurian yuan. Organization and functioning of the company to handle these projects will be under Government control.

Transportation and Communication Lines

During the first half of the year the Central Government launched a five year program for the construction of 5,000 kilometers of new railways and extensive plans for improvement of existing lines. Long-term credit loan agreements were made with certain blocs of foreign capital for carrying out these plans. The events of the latter half of the year caused very extensive damage to the railway lines and their rolling stock, and postponed the whole program of new railway construction. Such lines as continued operations were employed mainly for military purposes. In Manchuria, 400 kilometers of new railways were opened to traffic during the year.

Highways.—China's highway system now embraces 100,000 kilometers of roads opened to motor traffic, and during the first half of the year under review, 15,000 kilometers of additional highway were under construction with 45,000 kilometers additional projected. Considerable emergency construction was carried out during the latter half of the year in connection with military activities, but otherwise highway developments suffered a serious set-back.

Aviation.—At the end of 1937 the main routes of air travel in China were out of commission, but very heavy airway traffic was being carried on between Hongkong and Hankow, between Hongkong and Chungking, and between Hankow and the cities of the upper basin of the Yangtze River.

Shipping.—Indicative of Shanghai's shipping situation is the fact that 90 per cent of the total number of vessels entering and clearing the port for 1937 occurred during the first seven months. In early August, over 200,000 tons of Shanghai-bound cargo was afloat from Europe and America. Most of this was subsequently diverted to other ports—especially Hongkong—where shipping and warehouse facilities became congested. At the end of the year it was estimated that Hongkong held in storage 100,000 tons of cargo more than its normal capacity.

Telephone and Telegraph Communications.—In Hankow it was possible at the end of the year to communicate by telephone with all large centers of population still under control of the Central Government, and also at Hongkong. In September, the Japanese-Manchuria Telephone & Telegraph Co. established a station in Tientsin which provided the only means of commercial communication between Tientsin and the outside world.

Experimental broadcasts were made from China to the United States by commercial radio, in the endeavor to establish a commercial radio service during the early months of 1938.

Finance and Banking

While all payments of China's foreign and domestic obligations were met during the year in the face of drastically reduced revenues, it is uncertain how long they may be continued. A liberty loan issue was made in September for 500,000,000 yuan, of which probably 300,000,000 yuan have been taken up. Note issues of the four Government banks increased somewhat during the year, but apparently not enough to threaten inordinate inflation. In many parts of the country the public appeared to prefer paper money to silver, on account of ease with which paper can be concealed or transported. Immediately after the outbreak of hostilities nearly all banks in China suspended business for several days, reopening under conditions which practically amounted to a moratorium. While foreign banks were not subject to these regulations, they co-operated with the Government's financial authorities. In the

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Economic Highlights in Japan During 1937

(Based on a report from American Commercial Attaché Frank Williams, Tokyo, appearing in Commerce Reports)

The year 1937 was characterized in Japan by unusual economic, military, and political events. Economic changes set in motion during the first half of the year provided the nucleus for the more drastic changes brought about during the second half by enforcement of State control over practically all phases of finance, industry, and trade. The intensified planned economy was motivated chiefly by the country's defense program and substantial increase in the national budget for the 1937-38 fiscal year. Despite the uncertainty created by control measures, economic progress moved steadily forward to a moderate advance over the 1936 high, unmistakably aided by improved world business conditions. Efforts toward achievement of self-sufficiency and enlargement of export markets continued, and, together with increased demand after July for munitions and allied materials, formed the bases for industrial and trade activity.

During the first half of the year, domestic business was improved, commodity prices advanced, and wages increased. Foreign trade expanded, but with an unprecedentedly large import excess, brought about largely by speculative purchases of foreign merchandise, which started in 1936 and ran well into 1937. The rising trend in commodity prices and the need for raw materials to expand the Nation's productive power in line with the Government's economic policy, gave further impetus to import buying. To stem the rising tide of imports and strengthen yen exchange, the Government enforced on January 8 stricter import exchange control regulations, and approved at the April session of the Diet several drastic commodity and industrial control measures which became effective immediately. Business was also exposed during the first part of the year to an unusually disturbed political situation with three Cabinet changes, one general election, and the regular business session of the Diet twice prorogated, once dissolved, and finally completed in May.

After the "Lukouchiao incident," of July 8, many additional emergency State control measures were enforced. These and others previously effectuated permeated into every recess of industrial, business, financial, and agricultural activity. Thus during the last half of the year the Nation was placed on an absolute wartime basis. Imports were being substantially curtailed and a large percentage of raw materials ordinarily used in the manufacture of export goods were diverted to the production of armaments and munitions. Exports likewise fell off, partially from depressed business conditions abroad, partially from the diversion of export energy and materials into the production of military supplies, and partially from informal boycotts abroad of Japanese goods. Stocks of manufactured and semi-manufactured goods for export increased substantially during the last few months of the year, while supplies of imported raw materials and partly manufactured products declined sharply.

Economic Legislation

Besides various budgetary bills, the following laws were approved at extra sessions of the Diet and were enforced during the year: (1) the Temporary Fund Adjustment Law, controlling new industrial investments; (2) the Law Concerning Temporary Measures Regarding Export and Import Articles, to control foreign trade and the consumption of goods; (3) the Ship Control Law; (4) the Law Concerning Emergency Rice Measures, to replenish stocks of Government-owned rice; (5) the Fertilizer Distribution Control Law; (6) the Application of Armament Industries Mobilization Law; (7) the Imperial Fuel Investment Company Law; (8) the Iron and Steel Industry Law; (9) the China Incident Taxation Law; (10) the Revision of the Anti-Profiteering Law; and a number of others of less importance. Such financial measures as the Gold Reserve Revaluation Law, the Gold Fund Special Account Law, and several revisions to the Exchange Control Law were likewise effectuated.

Industrial Activity at High Level

Industrial expansion was the fundamental principle of the Government's economic program. From that many new industries were born, such as staple fiber and automobile, and domestic industries were accorded greater protection. The manufacture of munitions assumed larger proportions, the exceptional expansion of this branch being chiefly responsible for the year's increase in total industrial production. Doubtless 1937 was a record year in Japan's productivity. Industrial and business earnings moved upward, particularly toward the latter part of the year, as a result of the munitions boom. The general level of domestic business was substantially higher than for 1936, due to a great extent to expanded industrial production, higher wages, enhanced purchasing power, more favorable agricultural conditions, and greater demand for laborers.

Agricultural Conditions Somewhat Better

Production of principal crops during 1937 was considerably above normal. Despite the large crops, prices of agricultural products showed an average advance of nearly 11 per cent, making it appear that there was a considerable improvement in agricultural income. This improvement was minimized, however, by the failure of agricultural prices to keep pace with the general price level, which moved upward about 21 per cent. Since production costs were materially increased by the very sharp advance in fertilizer costs and by considerably higher taxes, it appears that the net income of agricultural producers was very little above the previous year.

Commodity Prices Advance—Industrial Employment Increased

There was a definite trend toward higher commodity prices, particularly in the latter half of 1937, despite declines in the general world price level. The wholesale price index for November was 16.7 per cent above the corresponding month of 1936, while the average for the first 11 months of 1937 was higher by 20.5 per cent. Retail prices showed a corresponding trend, the index number for December 15 being 12.2 per cent above the same date in 1936, while the average for the year increased by 9.5 per cent.

Factory employment improved steadily and wages advanced slowly. The tendency toward labor disputes was very pronounced during the first half of the year but disappeared after the Sino-Japanese conflict began.

Financial Situation

The regular budget for 1937-38 was raised by the special session of the Diet in September from Y.2,892,843,000 to Y.5,484,764,000 of which about Y.3,400,000,000 was to be raised through the issuance of public bonds.

Increased Government expenditures were reflected in a substantial increase in Japan's national debt, as the bulk of revenue is derived from bond flotations. At the end of 1937, the nation's outstanding obligations had reached a peak of Y.11,892,948,000 up Y.1,497,743,000 above December 31, 1936. Domestic bonds totalled Y.10,585,150,000 an increase of Y.1,513,026,000 but foreign bonds at Y.1,307,798,000 showed a decline of Y.15,283,000. National bonds issued during the year totalled Y.1,300,000,000.

Economic policies adopted by the Government early in 1937 called for an unusually heavy flow of funds into industrial production. This demand assumed exceptionally large proportions as the year progressed, as evidenced by the absorption during 1937 of newly established companies and capital increases of Y.3,440,000,000 an expansion of Y.1,743,000,000 over 1936. The upward tendency in money rates was accentuated after the outbreak of the Sino-Japanese conflict. Toward the end of the year, however, the Government, in co-operation with the Bank of Japan and the Industrial Bank of Japan, supplied ample funds from the Deposits Bureau of the Ministry of Finance and from national bond issues underwritten by the Bank of Japan to meet all requirements. Year-end money rates were the lowest for many years, while the Bank of Japan's note issue reached the high level of Y.2,399,000,000.

Bank deposits, excluding the Bank of Japan, increased during 1937 by approximately Y.1,500,000,000 and loans by Y.1,400,000,000 the level of the former as of December 31 exceeding the latter by about Y.4,000,000,000. Postal savings registered an exceptionally heavy gain of Y.312,000,000 during the first 11 months of the year. The volume and value of bill clearings soared to high levels, reflecting the expanded trading activity.

Foreign exchange rates were, on the whole, remarkably steady all through 1937. Sterling rates continued pegged at one shilling two pence, while yen-dollar quotations hovered around the $0.29 mark. Fluctuations in the latter rate reflected almost exclusively variations in the New York-London cross rate. Maintenance of these rates was accomplished mainly by heavy shipments of gold abroad, principally to the United States. The total amount of gold exported reached approximately 216,026 kilograms, valued at about Y.875,000,000.

Trade Agreements and Restrictions

The unofficial textile agreement concluded between textile interests of Japan and the United States, renewal of the trade pact with British India, conclusion of a new agreement with Burma, and minor arrangements with Turkey, Siam, and Italy, constituted the outstanding trade agreements of the year. The anti-Comintern agreement with Germany, although not a trade pact, signally enhanced demand for German goods. No outstanding trade restrictions were imposed on Japanese goods by foreign countries during the year and no serious trade disputes arose.

Increases Registered in Both Exports and Imports

Total foreign trade of the Japanese Empire increased 27 per cent in 1937 over the previous year, exports gaining 18.6 per cent and imports advancing 35 per cent. The excess of imports over exports, however, was 390 per cent greater than in 1936. Exports from Japan Proper totalled Y.3,175,418,000 against Y.2,692,976,000 in 1936, while imports amounted to Y.3,783,177,000, compared with the 1936 total of Y.2,763,681,000. Gains occurred in exports of foodstuffs, cotton textiles, raw silk, cotton and rayon yarns, and machinery. Detailed figures for all imports are not available, but from data at hand it is obvious that heavy increases were recorded by wool, iron, steel, ores, automobiles and parts, crude and heavy oils, machinery, pulp, lumber, leather, and internal-combustion engines. Raw-cotton imports showed only a slight gain in value and a drop in volume while ammonium sulphate declined substantially in both value and quantity.

The tendency toward increased exports of wholly manufactured goods and the import of raw materials continued, the former constituting 59.8 per cent of the total export value against 58.1 per cent for 1936. Actual raw materials accounted for only 52.7 per cent of the total imports, against 62.9 per cent in 1936, but semi-manufactured goods for further fabrication, such as iron and steel and other armament materials, together with wood pulp, leather, etc., amounted to 28.9 per cent of the total imports, as compared with only 17.2 per cent in 1936. The combined percentage of raw materials and partly manufactured goods for 1937 was 81.6 per cent against 80.1 for 1936.

Geographically, Asia, Oceania, and Central America dropped below 1936 percentages in total trade, but all other sections of the world registered gains.

Trade with United States Advanced

An extraordinary expansion occurred in Japan's trade with the United States during the year under review. Exports, valued at Y.639,428,000 were up nearly 8 per cent from 1936, while imports, amounting to Y.1,269,542,000 registered a gain of about 50 per cent over 1936. The excess of imports over exports in trade with the United States reached an all-time high of Y.630,114,000. This figure represents about 90 per cent of Japan's total import excess in merchandise trade for the year.

Shipments of raw silk to the United States declined about 3 per cent in value and 11 per cent in quantity from 1936. Cotton piece goods fell substantially below the fixed volume quota, while vegetable oils and electric light bulbs also lost ground. Material gains were registered, however, in exports of canned foods, silk textiles, pottery, strawbraid, and toys. The remarkable import gain was centered principally in hides and skins, pulp, phosphorites, iron and steel, automobiles and parts, ores, internal-combustion engines, and crude and heavy oils. Raw cotton dropped 17.7 per cent in value and 28.7 per cent in quantity. Lumber also fell off slightly.

China in 1937

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North China area plans were being consummated to establish a federated reserve bank under Japanese direction.

Foreign Trade Increases

China's total foreign trade for 1937 aggregated a value of 1,792,000,000 yuan, or an increase of nine per cent over the previous year. However, during the last five months of the year, imports fell off by 57 per cent and exports by 35 per cent compared with the previous seven months. The United States maintained the leading position it has occupied for several years past, supplying about 20 per cent of China's imports and taking about 30 per cent of the exports. So severely was the trade of Shanghai affected by military activities in its vicinity that 87 per cent of its total imports for 1937 and 70 per cent of its exports were credited to the first seven months. As the year closed, the port was becoming increasingly isolated from the interior by both land and water, and many business firms were finding it necessary to establish contacts in Hongkong.

Tientsin's recorded imports from abroad represented nine per cent of China's total imports in 1937, compared with 7.7 per cent in 1936, while imports amounted to 15.4 per cent of the total compared with 16.7 of the previous year. Substantial increases occurred in both import and export trade with the United States during the first half of the year, but a considerable decrease resulted in the last half.

Manchurian Trade Gains

Figures for the foreign trade of Manchuria indicate an increase in exports of six per cent over the previous year and an increase in imports of 27 per cent. Manchuria's unfavorable trade balance of 243,000,000,000 yuan was primarily the result of imports of heavy industrial equipment and for materials of military defense.

Japan is credited with taking 50 per cent of Manchuria's exports and supplying 75 per cent of its imports during the year. The United States purchased three per cent of exports and supplied five per cent of imports, but toward the latter part of the year import and exchange control measures seriously militated against trade with the United States.

In June 1937, the trade pact between the Manchurian area and Germany was renewed for three years.

American Claims in the Pacific

Discoveries of Early American Whalers Cited in Island Dispute with Britain

By RUSSELL OWEN, in the "New York Times"

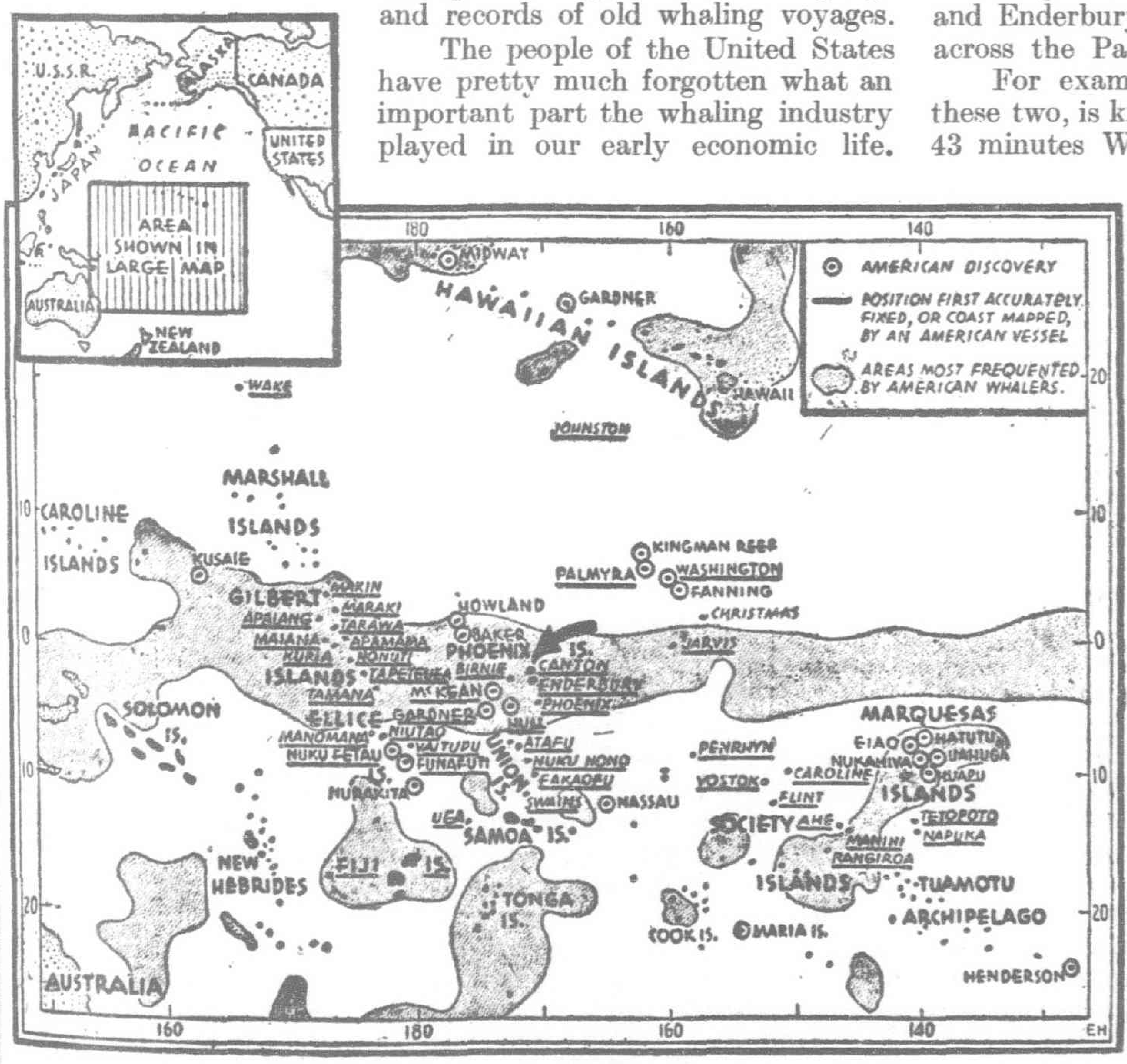
THE amiable controversy between the United States and Great Britain over the sovereignty of South Pacific islands, particularly the islands of Canton and Enderbury in the Phœnix group, has revived interest in the explorations of the early American whalers who combed these seas in their search for sperm whales. The geographical work of these hardy New Englanders has been largely forgotten, although at one time they were frontiersmen in the best sense of the word.

American whalers began their fighting in the Pacific soon after the Revolution, following merchant ships which built the trade routes to China. Whalers were largely responsible for the importance of Hawaii, and as a result of their enterprise the Hawaiian group was settled and eventually taken over by the United States. But the adventures of the whalers led them far beyond these islands. A path charted by S. Whittemore Boggs of the Department of State for the American Geographical Society of New York shows how the hardy men of New Bedford, Nantucket and other Eastern ports wandered through all the South Pacific groups, discovering scores of islands which had not been seen by the early explorers or traders.

The Wilkes Expedition

The facts concerning their discoveries have seldom been collected: about the only thorough report is one made by J. N. Reynolds, a member of Congress who in 1836, because of his interest in exploration pushed through Congress a resolution which made possible the famous Wilkes expedition, a voyage on which the true continent of Antarctica was first seen. This expedition touched at many unknown islands in the Pacific. Mr. Reynolds was such an enthusiast that he went to the Antarctic himself in a small ship, and spent a long time examining logs and records of old whaling voyages.

The people of the United States have pretty much forgotten what an important part the whaling industry played in our early economic life.



Pacific islands first sighted by American whaling vessels haven taken on new importance because of a friendly argument between the United States and Britain over sovereignty of a number of these small dots which are now needed as bases for flying boats

Mr. Reynolds found, for instance, that in 1835, 103 years ago, there were 460 whaling ships sailing from New England ports and from New York. Of these, 154 put out from New Bedford, 71 from Nantucket, 15 from Warren, R. I.; 31 from Fairhaven, 17 from Bristol, 29 from New London, 24 from Sag Harbor and 6 from New York.

They averaged about 375 tons and altogether, made up 172,000 tons of shipping, representing about one-tenth of the United States maritime tonnage. The ships cost about $40,000 each and represented an invested capital of $18,400,000. This country's exports in whale oil and subsidiary products amounted to $1,165,990. The ships used in export and other traffic connected with marketing the products of whaling brought the total tonnage of the industry to about 200,000, with an invested capital of $60,000,000. The gross income was from five to six million dollars and 12,000 seamen were employed.

Accurate Observation

American whalers built what was known in those days as "American Polynesia," a title which has disappeared from the maps of the world. They began their adventures at a time when the sextant was coming into general use, and not long after fairly accurate chronometers had been made available. Hence their observations were unusually true. The extent of knowledge of that part of the world in which they operated was surprisingly limited. Mr. Reynolds, for instance, in 1836, in a speech, referred to the Fiji Islands, which were then spelled "Feejee." "Where are they?" he asked. Nobody knew with any exactness, except, perhaps, the whalers.

A report made by Reynolds lists dozens of islands and groups, with their latitude and longitude, among them islands whose latitude and longitude correspond strikingly with the position of Canton and Enderbury Islands, now needed for the extension of airways across the Pacific.

For example, the position of Canton Island, the larger of these two, is known as 2 degrees 49 minutes South and 171 degrees 43 minutes West. It is an atoll with a lagoon nine miles long. Reynolds's report lists the Mary Balcouets Island, "surrounded by a reef twenty leagues (sixty miles) in circumference, with only four openings where boats can enter." Its position is 2 degrees 47 minutes South and 171 degrees 58 minutes West. The circumference of the island is about that of Canton, and the position is almost exactly the same.

Opinion of Mr. Hughes

The question of sovereignty has been raised because of the lapse of years. Charles Evans Hughes, while he was Secretary of State in 1924, said: "It is the opinion of the department that the discovery of lands unknown to civilization, even when coupled with a formal taking of possession, does not support a valid claim of sovereignty unless the discovery is followed by an actual settlement of the discovered country." Mr. Hughes' opinion was written, however, with an eye to polar regions, where actual settlement is rare and sometimes impossible; his words: "unknown to civilization," seem to apply much more to the Arctic and Antarctic than to islands in the Pacific.

The recent announcement from the White House would indicate that the State Department, at present, does not interpret Mr. Hughes' dictum as applicable in this instance, and believes that importance of the islands makes necessary a restatement of the right of discovery.

Dawn of New China

By HITOSHI ONISHI

(Translated from "Bungei Shunju")

On the day following the capture of Nanking, a memorable event in the annals of military strategem, there was born in North China a promising new régime whose aim is a peaceful and tranquil China and to secure the peace of the Orient.

Prior to this, in various parts of North China there had been formed committees for the preservation of peace and order, such as those at Peking and Tientsin, and the autonomous governments in South Chahar and North Shansi, as well as the federated autonomous government of Suiyuan and Inner Mongolia. The earlier committees were only temporary, their purpose having been to readjust the situation created by hostilities, but they prepared the ground for the new régime, and were instrumental in restoring peace and order in their respective regions.

New Government Necessary

Altough various speculations were made and doubts entertained as to the possible nature of the projected régime, one thing was most clear—the fact that so far as Japan was concerned it was desired that a new government be established through the voluntary action of the Chinese people with the necessary qualifications of a really central government. And when the new régime was announced it included many representative Chinese whose participation was considered well-nigh impossible in North China even by extending its scope to the Shanghai region.

The new government has not adopted the rigid and unalterable pattern which hitherto obtained. It has followed a commission system based on the principle of mutual independence of the legislative, executive and judicial departments. This may be due to the policy implied in its appellation, the "Provisional Government of the Republic of China," of perfecting its structure and *personnel* gradually. It leaves sufficient room to take in many capable men from various circles. The significant fact is that the announced members of the various committees are such eminent personalities as could hardly be expected to participate in the organization of the new government. They are elderly men who have already won fame in their respective fields and had only to spend the rest of their lives in peace. That they voluntarily came forward to meet the situation may well be attributed to their sincere desire to save China in the present crisis and to bring about peace in the Orient through co-operation with Japan.

It is notable that, despite demands in some quarters for a federation of autonomous governments of the various provinces, the government as actually created has assumed a centralized form, embracing a system of appointing governors of provinces. The post of the highest presiding official, however, has not yet been filled.

Opposed to Kuomintang

What, then, will be the relations between this new régime and the Nanking Government ? It seems obvious that the two governments stand opposed to each other. The new Peking Government has for its *raison d'être* a resolute policy of combatting the Comintern and of promoting friendship with Japan, while the Nanking Government still pursues its policy of collaborating with the Comintern and opposing Japan. Hence, it is imperative for Japan to co-operate with the former government and to continue to deal crushing blows to the latter. It is perfectly natural, however, in view of the complex internal circumstances of China that the Japanese Government is maintaining a calm attitude of watchful waiting, neither extending recognition to the Peking Government nor repudiating the Nanking Government.

At any rate, it is encouraging that, even before hostilities have ceased, there has emerged in North China a new government destined to fulfil the ideals of Japan—the firm establishment of peace in the Orient through untrammelled co-operation between Japan and China and joint opposition to Communism. These are the ideals for which Japan has been fighting in the present China affair at great cost of life and property.

Viewing the *personnel* of the Peking Government, the writer notes that the Legislative Committee Chairman, Tang Erh-ho, is reputed as a scholar of upright character. He was a committee member of the Hopei-Chahar Political Council and is now President of the Peking University. Wang Ko-min, executive Committee Chairman, is the leading figure in North China business circles. Having served as President of the Bank of China, and later as Minister of Finance at various times since the Wang Shih-chen Cabinet, Mr. Wang subsequently was a member of the Committee for the Adjustment of Political Affairs of North China, and was considered as a possible successor to Huang Fu, its presiding officer. In the Hopei-Chahar Political Council he held the important post of Chairman of the Economic Committee, and was on the point of putting into execution his policy of Sino-Japanese economic co-operation. Tung Kang, Judicial Committee Chairman, previously served as Minister of Justice and as President of the Shanghai College of Law. His contributions in the educational field are widely acknowledged in China.

New Head

As to who will become the presiding official of the new Peking Government, it seems that General Wu Pei-fu is the greatest possibility, as he is beyond any criticism of his personal character. Hsu Shih-chang, who had been expected to join the new government, is the undisputed veteran in politics, but he is understood now to have no personal desire to assume the presidency. General Tsao Kun, who lost his office as president of China at the time of Feng Yu-hsiang's *coup d'etat*, is reported to be quite interested in the new leadership, but there is no chance of his securing it. However, it is not entirely impossible that there will emerge some one in the Nanking Government qualified to assume that position, which may or may not be the reason why the chair of the presiding official is left vacant.

As for the attitude of General Chiang Kai-shek, it is assumed that he will not yield, and, therefore, there can be no talk of peace or compromise between Japan and China. It is nedless to mention that, whatever may be said about General Chiang's dislike for the Communist Party, he certainly cannot help collaborating with it because of the pressure of anti-Japanism. This is not meant to imply that the Kuomintang and the Communist Party can get along permanently on friendly terms. However, there is at present no prospect of conflict between them because of mutual antagonism, which, in fact, does not exist now. It is to the advantage of the Communist Party to assist and co-operate with Chiang Kai-shek to a certain extent, as the Soviet Union is of that attitude.

With its various departments scattered in Hankow, Chungking and Changsha, the Nanking Government will continue to utilize the Hankow-Canton Railway for close contact with Hongkong and Canton regions in hope of further assistance from Great Britain, who, though she may alter her attitude as conditions change, is not yet considered contemplating withdrawal of her aid to China. Consequently, in spite of the fact that large scale military operations are thought to have come to an end for the time being with the capture of Nanking, the writer is of the opinion that in order to really crush the Nanking Government the Hankow and Canton regions must be dealt a convincing blow. Accordingly, Japan must be determined as ever, and prepared for a long war, and in the meantime give full assistance to the new Peking Government and follow a steady policy of economic collaboration with that government.

The Harbor of Chefoo, Shantung, North China

By HERBERT CHATLEY, D.Sc. (Engineering), M.Inst.C.E.

(Reprinted from The Dock and Harbor Authority)

THE province of Shantung (" East of the Mountains ") lies between the present and the old mouths of the Yellow River and is generally hilly. On the east, the province projects into the Yellow Sea forming the Shantung Promontory, which is the easternmost part of China proper and closely approaches the Liaotung Peninsula of Manchuria and the coast of Korea. The gap is only about 70 miles across to Manchuria and 125 miles to Korea. There are practically no navigable rivers in Shantung, the only one of any significance being the Hsiao Ching Ho, which gives a shallow draught passage for junks to the provincial capital, Chinan Fu, some 120 miles from the sea. On the southern side of the Promontory is the natural harbor of Kiaochow, better known as Tsingtao, which has been developed by Germans, Japanese and Chinese, and is connected by railway to Chinan Fu. Various coal mines and stone quarries are located near to this railway.

On the northern side of the Promontory there are three "Treaty" ports open to foreign trade, Lungkow, Chefoo and Weihaiwei. Of these, Chefoo is the most important. Its only inland communication is by road. It is about 110 miles by road from Tsingtao and about 130 miles by road from the nearest station (Weihsien) on the Chinan-Tsingtao railway.

The effective hinterland of Chefoo is not more than some three thousand square miles with a population of perhaps three million people, mostly peasants with low purchasing power. The Port of Weihaiwei also serves a small part of this area, but has practically no facilities for commercial shipping. Lungkow is a shallow draught port. Tsingtao does from five to ten times as much trade as Chefoo.

In the year 1936 the exports for foreign destinations from Chefoo were valued (f.o.b.) at about ten million Chinese dollars, or say £600,000. Most of this goes to Shanghai (about 450 miles) for transhipment. The foreign imports had a value (c.i.f.) of about seven million dollars, making a total of foreign trade of about sixteen million Chinese dollars, or roughly one million pounds sterling. In addition, there is a coastal trade in Chinese goods, of comparable value, making a gross trade of about two million pounds value moving annually. The physical volume is over 500,000 tons.

The trade is rather less than it was before the Great War, but would undoubtedly have diminished to insignificant figures had it not been for the harbor works.

Chefoo was opened as a "Treaty" port in 1858, but until 1915 was only an open roadstead with no shelter from the east; lightering was impossible about ten per cent of the time, so that great losses were suffered by delay and damage to cargo.

Meteorology

The most notable features of the weather at Chefoo from the shipping aspect are violent winter gales, rare typhoons in the late summer, severe frost in the winter and a high temperature in the summer. It is scarcely ever closed by pack ice.

The temperature varies from a recorded minimum of—12.8 degrees C. (9° F) to 40.0 C. (104° F), but the usual minimum (dawn of February 1) is —5.4 C. (22° F) and the usual maximum is 30.4 C. (87° F) on the afternoon of July 31. The usual daily range is from 6° C. (11° F) in winter to 10.5 C. (19° F) in early summer. Occasionally more violent changes may occur.

Snow has fallen as early as October 23, and as late as April 10, but usually only happens in December, January or February.

The mean annual rainfall is 23.18 inches, with an average monthly value of 0.27 inches in February, 5.87 inches in July, and 5.71 inches in August. The winters are thus cold, clear and

Boat Jetty, Chefoo

dry, and the summers hot and wet. Great deviations from the average may occur in the rainfall. Usually, there are only four rainy days in February, 12 in July and 11 in August, with an average total of 84 per annum.

Wind is most frequently from the south or S.S.W., but the strongest winds (typhoons excepted) are the winter gales from the north. The maximum value observed in 1913 was about 30 meters per second (nearly 100 feet per second, or 70 miles per hour), but this was not an exceptionally high value. Gusts during typhoons are reputed to reach twice this velocity, and as the air may be laden with perhaps 100 per cent of its weight by rain drops the dynamic pressures possible are very high.

Tides

The tidal wave comes up from the south and swings anti-clockwise into the Gulf of Pei Chihli (Pei Hai), arriving at Chefoo on the day of full or new moon at about 10.34. The strongest tides occur about two days after the full or new moon. There is a marked diurnal inequality at about the solstices. Throughout the Gulf, owing to the diurnal inequality, reflections of the tidal wave from the shores and wind, the tidal rises are rather irregular, especially at neaps.

Highest high water is only about 11 feet above the lowest low water (Chefoo zero, Datum level). Spring low water is considered to have a " rise " of 1.8 feet above zero and spring high water about 8.5 feet rise.

The mean spring range is thus 6.7 feet.

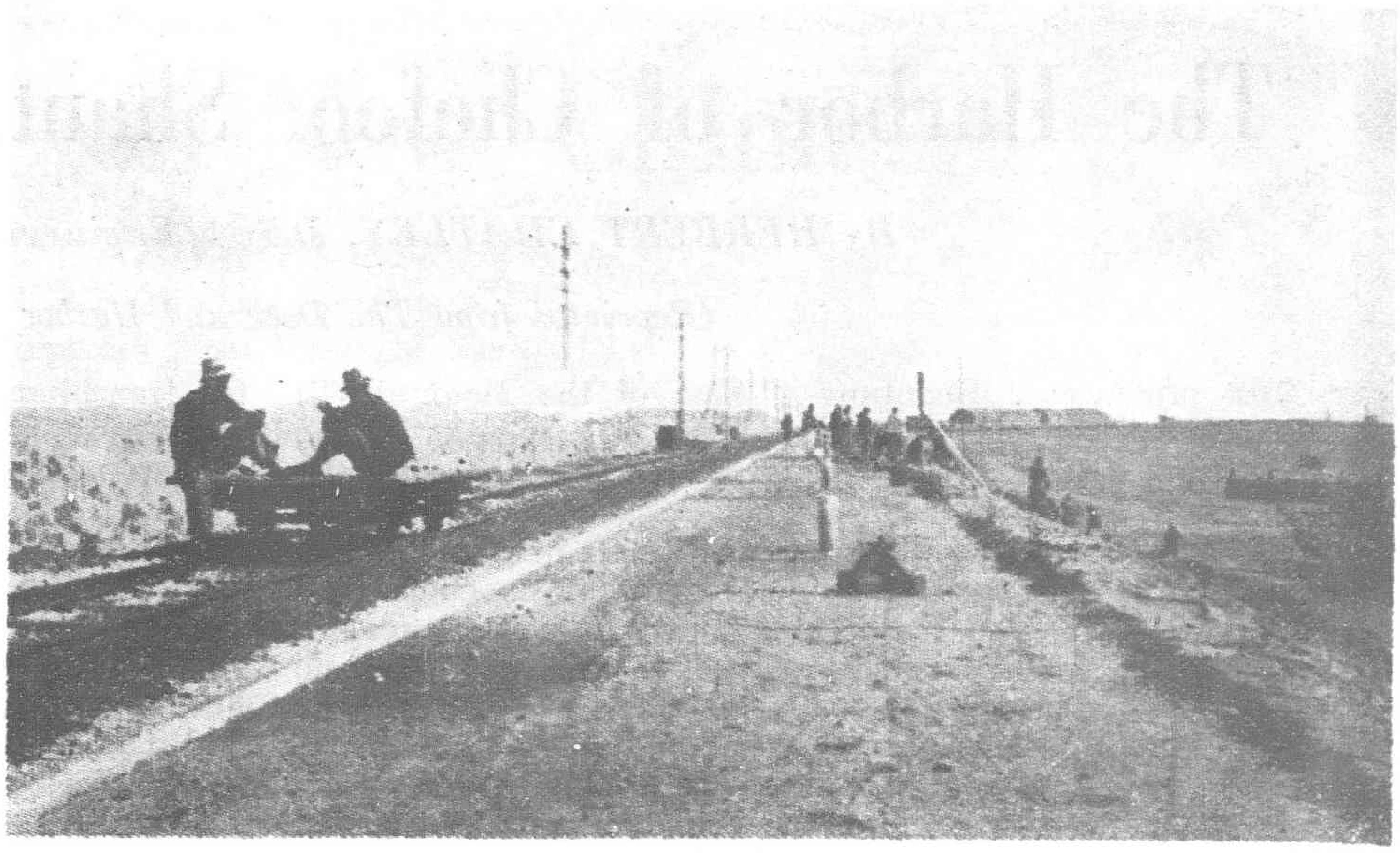
Exposure and Physical Conditions

The heaviest wave action is from the N.E., and the maximum wave impact is considered to be 20 tons per square meter.

The open roadstead of Chefoo consists of a bay which is roughly semi-circular, nearly three miles across, facing a little south of east. The actual town is behind a small rocky promontory (" Tower Hill ") on the south side of the bay. The northern shore of the bay consists of a ridge (" Chefoo Bluff "), about four miles long, rising to nearly 1,000 feet high, which is united to the mainland by a sand-bank across which the N.W. winds can blow freely. To the west of the bay are low sand hills.

The general low-water depth along a line from Tower Hill to the E. end of the Chefoo Bluff (Chefoo Cape) is 25 feet. The 18-ft. contour approaches Tower Hill rather closely. The water shoals rather rapidly towards the western side of the bay, so that there is but little natural shelter during easterly gales, but moderately good protection from the N.W. winter gales in the north part of the bay. In the south part of the bay, the " fetch " is sufficient for N.W. winds to disturb ships appreciably.

The Mole (inside slope). Godowns and Quay in distance



Road on the Mole

The sea bed generally consists of mud and fine sand, the sand predominating at about seven feet below the bottom and gravel being found some 12 feet below the sea bed.

Shipping Requirements

The coasting vessels which frequent the port rarely exceed 4,000 tons net register, but occasionally ships up to say 10,000 tons may call. Navigable depths of 20 feet are therefore usually sufficient, but some accommodation for 28 feet draughts is desirable.

In Shanghai, the net tonnage of steam shipping entered and cleared is about one net ton for every thirty Chinese dollars (say £2) value of goods. Since Chefoo's total trade is about £2,000,000 per annum, this would correspond to about one million net tons of shipping. As Chefoo is, however, a port of call, while Shanghai is for many ships a terminal, its ratio of tonnage to trade is much higher, and a harbor capacity for at least four million net tons per annum is necessary. The present tonnage is somewhat less than this. The average coastal ship is not much more than 1,000 tons register, so that this corresponds to about 4,000 entrances or clearances per annum, or 2,000 calls, equivalent to less than six per diem. Allowing an average stay of two days, this means that the average number of ships in the port is less than twelve, or allowing for " bunching " the actual number might be twenty.

Nature of Cargoes

Exports from Chefoo are mostly bulky agricultural products. The principal items are :—

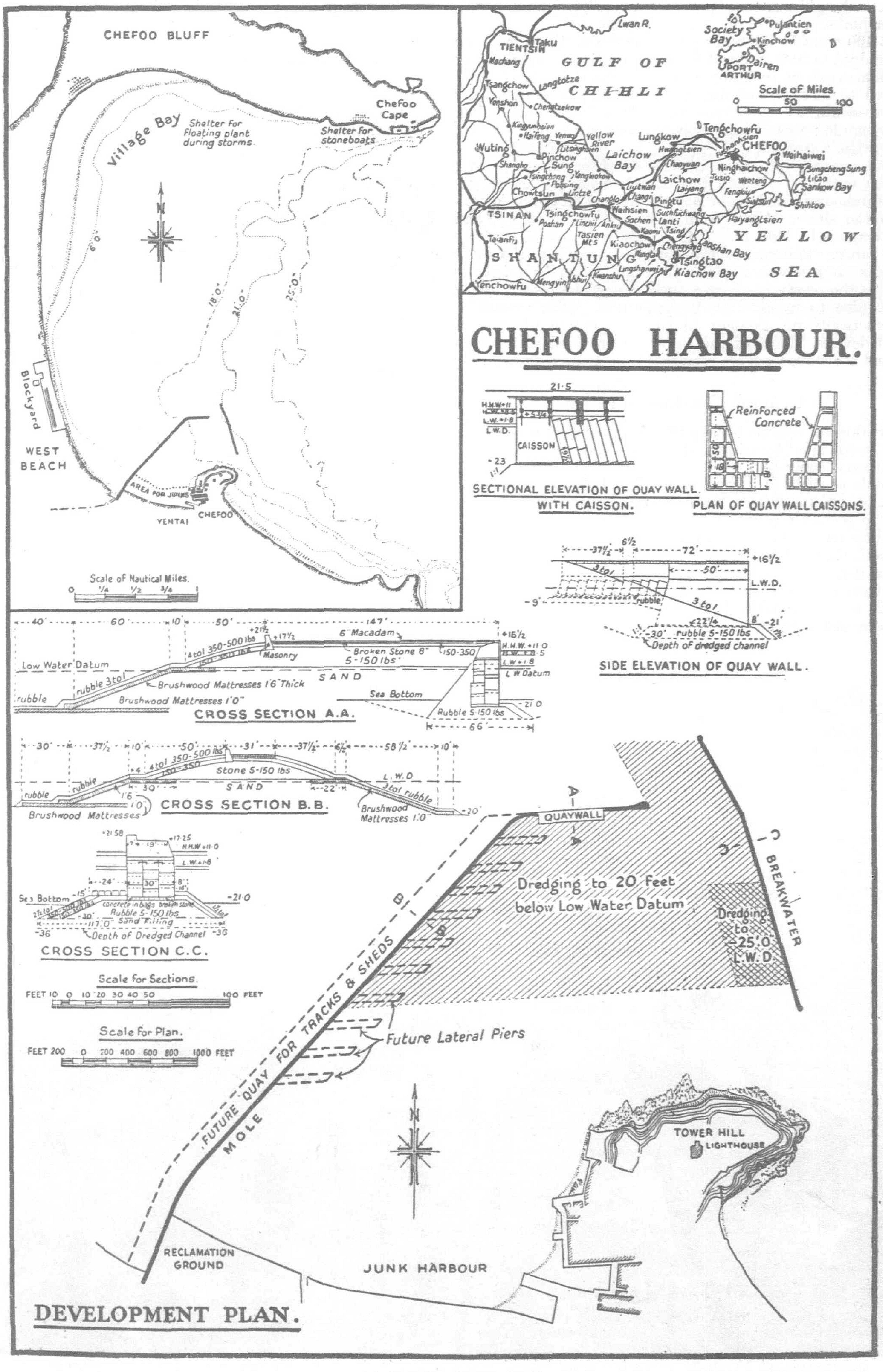
Beancake, vermicelli, ground nuts, hard cereals, oil seeds, fruit, wines, pongee, raw silk, lace and hair-nets.

Imports are metals, kerosene, cigarettes, cotton textiles, coal, timber, paper, soap, sugar, rice and sundry manufactured articles.

There is a fairly considerable passenger business, the bulk being farm labor migrating to other parts of China. As many as 250,000 persons per annum have been carried. Chefoo is a summer resort for foreigners, including the U.S. Navy, and this involves a certain amount of saloon accommodation on the ships.

The Artificial Harbor

The lay-out of the artificial harbor, which is in the south part of the bay, adjacent to Tower Hill, is shown in the illustrated Plan. It forms an area of approximately 250 acres, enclosed by a mole nearly 6,000-ft. long connected to the shore and an island breakwater 2,600-ft. long. There are two entrances 755-ft. (450-ft. clear) and 830-ft.



CHEFOO HARBOUR.

DEVELOPMENT PLAN.

wide respectively. The latter ("South Entrance") is for emergency use and for junks.

About 100 acres in the outer part near the northern entrance has been dredged to 20-ft. below datum to serve the coastal shipping and a small area (about 10 acres) adjacent to the island breakwater was dredged to 25-ft. below datum. The latter is designed for the larger vessels which sometimes call and for the naval shipping.

The remaining part of the sheltered area serves for lighters, junks and wave extinction.

A small quay, 600-ft. long, is built out from the mole near the northern entrance. Behind this on the mole are two "godowns" (warehouses), and there is a motor road on the mole connecting to the shore. Apart from this quay, all discharge and loading of cargo is by lighters. This is mainly due to the low cost of manual labor. Throughout the East, except where the overhead charges on mechanical plant or wharves can be offset by reductions in the overhead charges on numbers of very expensive large ships (due to rapidity of discharge and "turn around"), there is practically no economy in using expensive wharves or mechanical devices. Most of the ships are provided with ample derricks, and the stevedores are remarkably competent in handling loads.

General Construction

The breakwater consists of very massive blockwork on a rubble foundation, terminated by reinforced concrete caissons and finished above with mass concrete.

The mole consists of a sand core, pinned down with willow brushwood or reed mattresses, and a covering of rubble increasing from 5 lb. to 500 lb. pieces.

The quay on the mole is of concrete blockwork with corner caissons, both on a rubble foundation.

Typical details are given in the Plan.

The structures were built under contract during the years 1915 to 1921 by the Netherlands Harborworks Co., of Amsterdam, at a cost of about £350,000.

The project was financed by a bank loan, for the redemption and interest of which a small tax was placed upon shipping and merchandise.

Messrs. O. C. A. van Lidth de Jeude and B. van Exter, both of the Netherlands Harborworks Co., were mainly responsible for the design and execution of the work. The present writer is largely indebted to the reports of these gentlemen for the information given in this article.

Works Lay-out

In the Plan is shown the general arrangement of the works, including quarries at Chefoo Cape, with storm shelter nearby for the stone boats, and the Main Workyard on the West Beach, which includes a large area for making the concrete blocks with two jetties, a space for making the brushwood mattresses, workshops and offices.

The reinforced concrete caissons were built and launched at Chefoo Cape ("Bluff Depot").

About 20 Europeans and up to 1,500 Chinese were employed on the job, the working hours being from sunrise to sunset. During the frost season (about 2½ months) most of the operations were suspended.

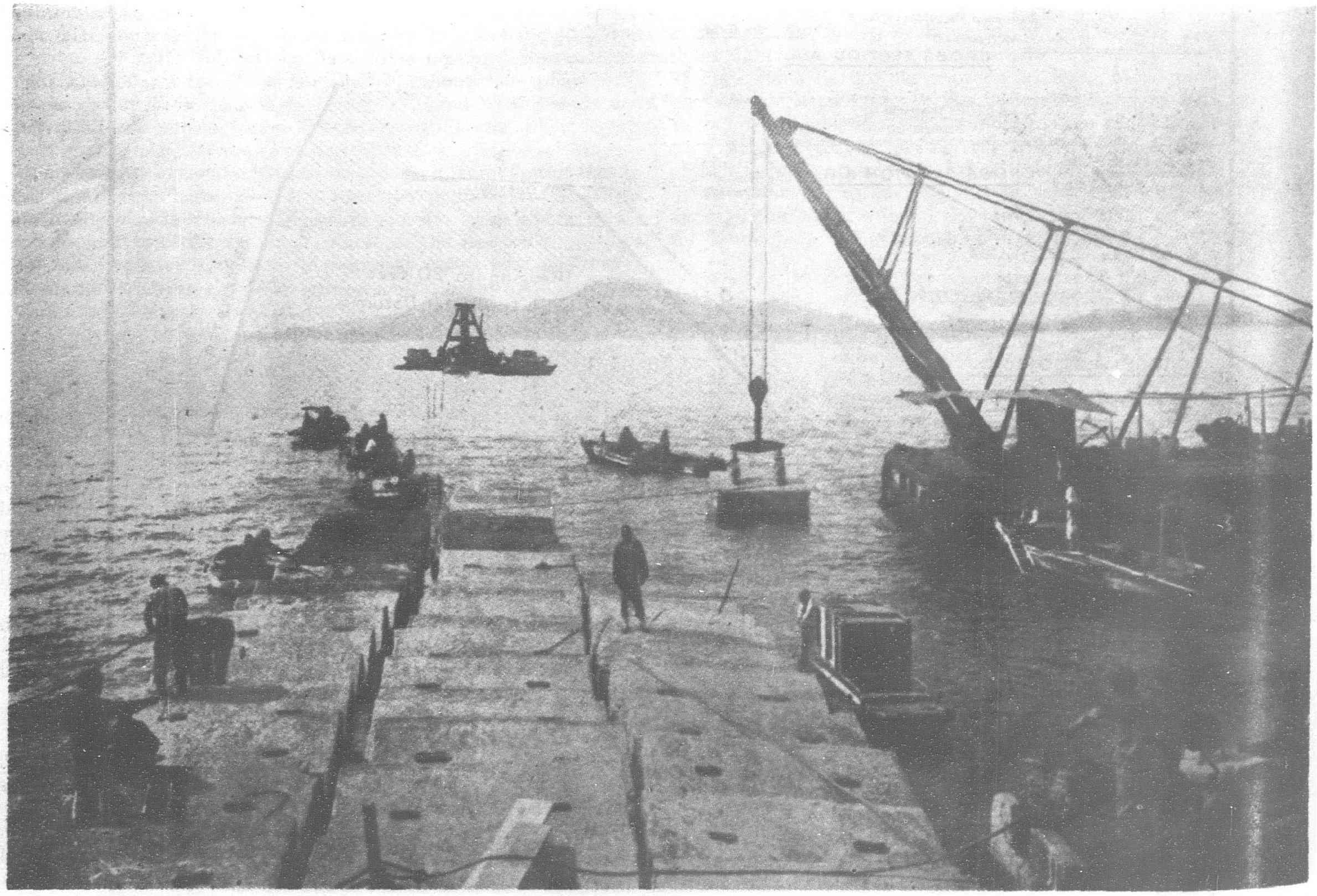
The shore plant used consisted of two 35-ton cranes, seven smaller cranes, etc. The very considerable floating plant (bucket dredger, sand pump, two 35-ton floating cranes, lighters, etc.) was towed from Shanghai to the job. During the work it took shelter in the north of the bay when the necessity arose.

There were no facilities for mechanical repairs in Chefoo, so that the works had to be quite self-contained.

Breakwater

The essential features of the breakwater structure were as follows :—

(*a*) Excavation by bucket dredger of a trench 117-ft. bottom width to at least 30-ft. below datum and down to good sand. The bottom was then levelled up to 30-ft. below datum with sand.



Quay under Construction

(*b*) Tipping of a rubble mound 10-ft. thick up to 20-ft. below datum, with a core of stone increasing from five to one hundred and fifty pound pieces. The top of this mound is 62-ft. wide, with outer slopes of 1 in 2½ and inner slopes of 1 in 1½. The slopes and berms were covered with two layers, each 3-ft. thick on the outer side and 2½-ft. thick on the inner side, the first layer consisting of stones from 150 to 350 lb. apiece, and the top layer of stones from 300 to 500 lb. apiece.

A bedding layer of broken stone was originally specified for the base of the blockwork, but was changed during the job for concrete bags, owing to the wash-out of the smaller stones.

(*c*) The blockwork consists of three rows of 1 : 2½ concrete blocks set at a slope of 75 degrees. The outer rows are of three blocks per course, each block 10-ft. by 8-ft. by 6-ft., and weighing 32 tons ; and the middle row of blocks 10-ft. by 6-ft. by 6-ft., weighing 24 tons each. The joints are staggered and the top blocks are cramped together.

(*d*) The mass concrete capping (1 : 2½ cement concrete), including a parapet, was cast in lengths of 62½-ft., separated by layers of asphaltic paper. The top (excluding the 3½-ft. high parapet) is 18-ft. above datum and 30-ft. wide.

(*e*) The terminal caissons were built on a slipway and contained 150 cu. yds. of reinforced concrete. The reinforcement for the upper part of the caissons and the forms, when launched, drew about 6-ft. of water. The upper part was completed when afloat with a further 100 cu. yds. of concrete, the caissons then drawing about 11-ft. After setting in place, the compartments were filled with bag concrete under water and ordinary mass concrete for the top 12-ft. Sand was used as a filling in some of the inner compartments.

Mole

The mole, being in shallower water and much less exposed to weather, is of lighter construction than the breakwater. It bends towards and terminates at the northern entrance, and its end is there protected from easterly gales by the breakwater, which extends some distance northwards.

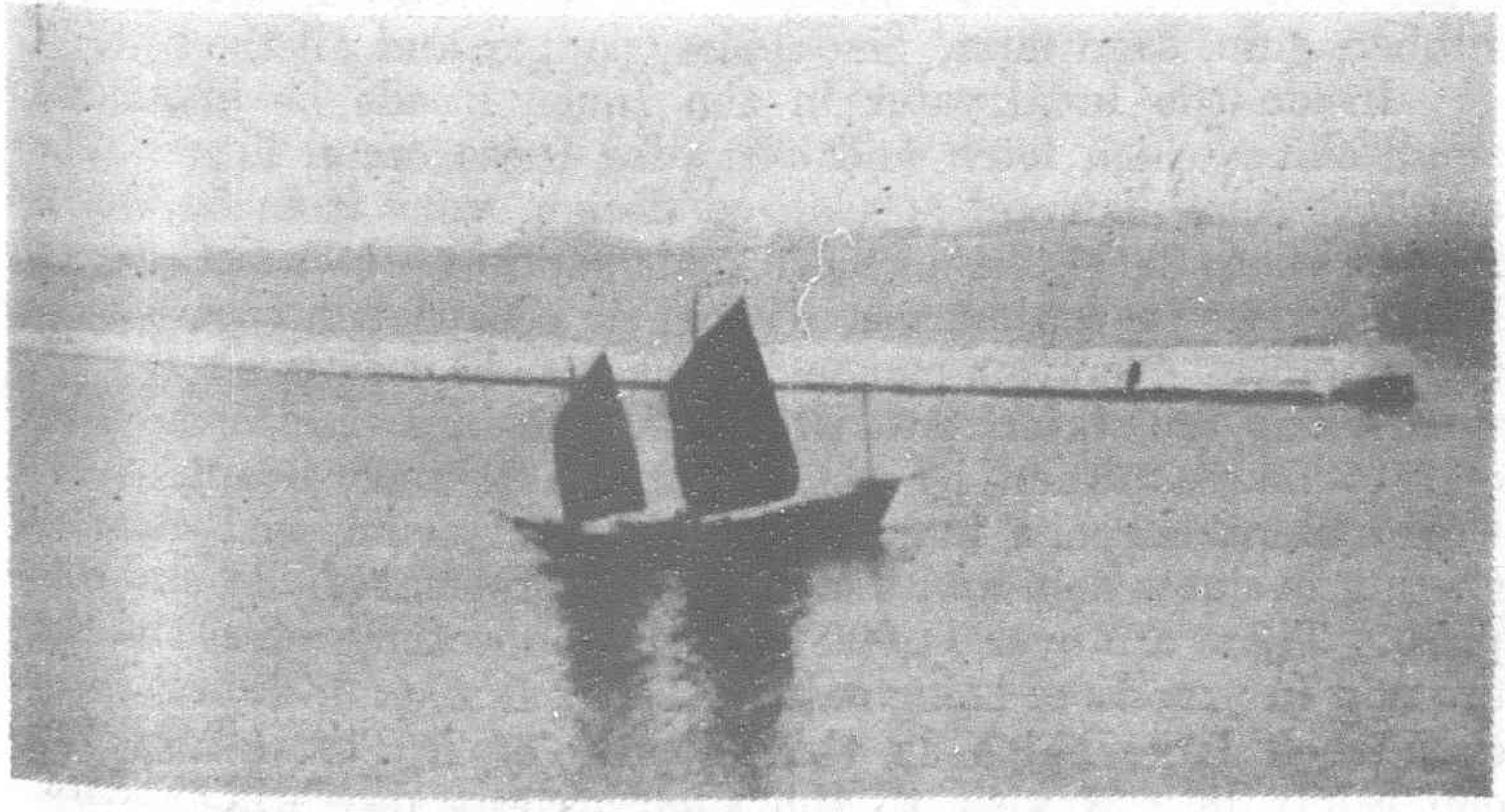
It was originally proposed that the mole should be mainly of sand, but it was later decided that all hearting above low-water level should be of rubble.

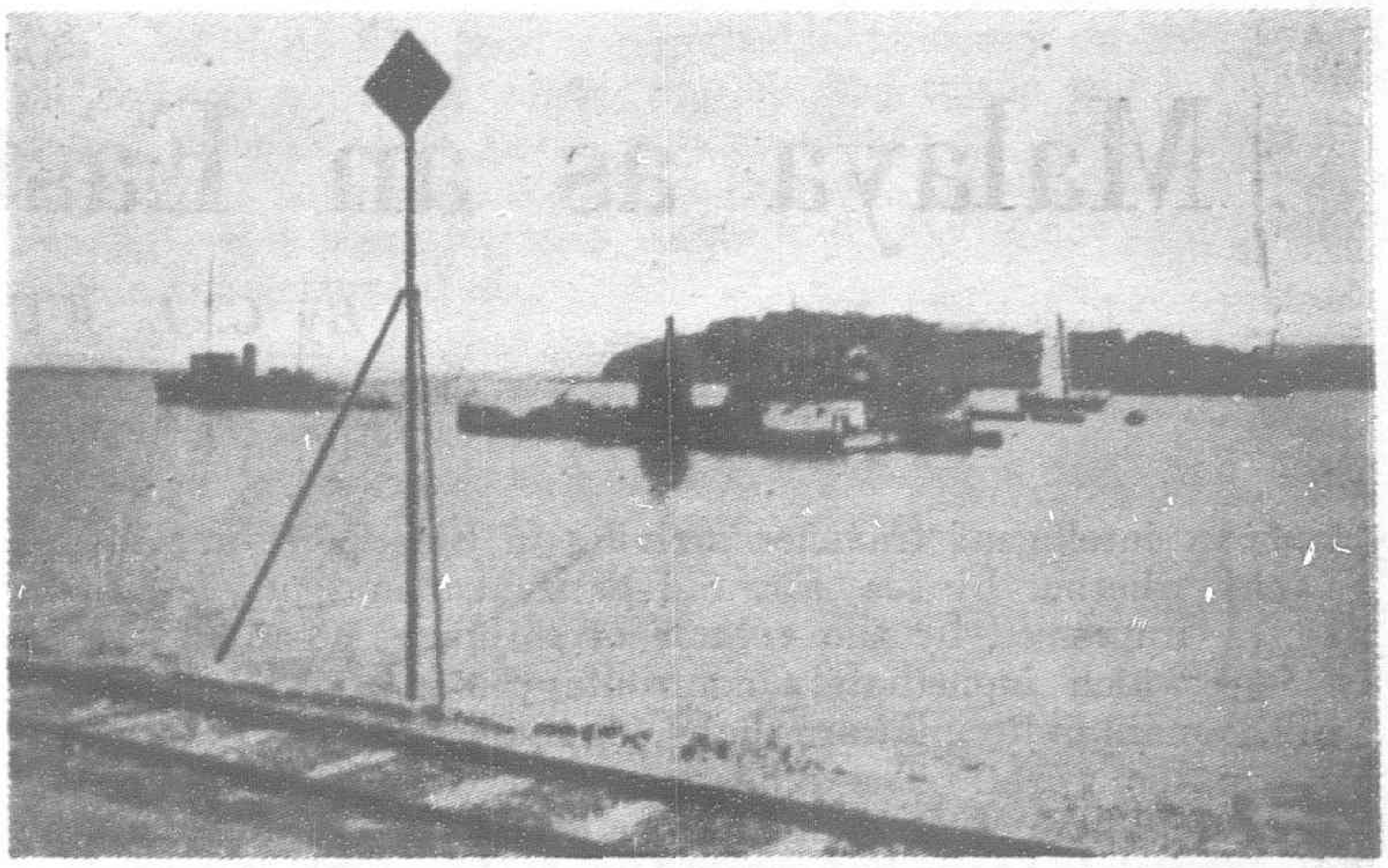
As with the breakwater, a trench was dredged down to a firm sand bottom, so as to provide an unyielding bed, and sand was tipped, or pumped between side dykes, resting on mattresses, up to datum level, the slopes being mattressed and covered with rubble. Within the wave zone, 500 lb. surface pieces were used, the most exposed slopes changing from 1 in 3 to 1 in 4.

The crown (including the 3-ft. high parapet) is 31-ft. wide.

The 600-ft. long quay is formed by building out from the mole on its inner side with blockwork and caissons similar to, but smaller than, the items used in the breakwater, making a platform 109-ft. wide.

The mattresses ("Zinkstuk" or sinking pieces) are of the usual Dutch style, similar to those used in the Shanghai training works. Each consists of two gratings of crossed brushwood ropes ("Wieps") with a layer of brushwood bundles between them and additional wieps on the top surface to form pockets for the rubble stone, which will sink them and later cover them. They were made on the adjacent beach, assembled during low water and towed off and sunk at high-water slack.


Breakwater. South Caisson and Entrance


View from Breakwater towards Tower Hill. Grab Dredger in foreground

The sand slopes are covered with a layer of clay (1 to 2½-ft. thick), on which 1-ft. of reed mattress is placed and pinned down with wieps, to form a seat for the rubble pitching and prevent escape of the sand prior to the completion of the pitching.

This type of structure, if carefully made, gives extraordinarily good results, especially if there is enough silt in the water to seal up the interstices. It is an extremely difficult business to remove old mattress-work and its elasticity and durability under water, to say nothing of its cheapness, are strongly in its favor.

Subsequent Works

The harbor works proved entirely successful and gave to Chefoo a new lease of life. The Chefoo Harbor Improvement Commission (founded in 1913), which is closely associated with the Chefoo office of the Chinese Maritime Customs, has maintained the works since the completion of the contract and has made some minor additions and improvements.

Moorings have been established, and two Customs godowns have been built with a motor-road approach. These godowns, into which small vessels can discharge alongside the quay, have proved a useful addition to the facilities of the port.

A certain amount of maintenance dredging has proved necessary, and last year (1936) the Commission acquired a new large Priestman dredger, which it is hoped will enable some deepening of the shallower parts to be done.

The shore line has been tidied up and a boat jetty has been provided. The land authorities have done some reclamation, but it is not considered that it would be expedient to allow any appreciable reclamation of the foreshore.

Future Works

While the future of China is so uncertain there is no immediate prospect of larger facilities being required in Chefoo. If, however, the neighborhood should become industrialized, which is by no means impossible, the accommodation for shipping will have to be increased. The whole basin can then be dredged and additional quays constructed from the mole, probably in a series of oblique slips, as shown on the Plan. The works are constructed in a manner which will safely allow depths of 30-ft. below datum to be excavated without affecting the stability of their foundations.

Lacking water communications with the interior and situated so close to Tsingtao, Chefoo has no prospect of becoming a first-class port, but there is no reason at all why it should not be a good second-class one.

Conclusion

It will be seen that this harbor is a very neat one, which well meets the actual requirements. The Netherland Harborworks Co., which has done excellent contract work in other Chinese harbors (Shanghai, Macao, Haichow, Hulutao, etc.), was in Chefoo practically responsible for both design and execution of the whole job, and must be congratulated upon a fine piece of work, which has fulfilled the expectations of its projectors.

Malaya as an Eastern Shipping Base

By C. E. WURTZBURG, M.C.

(From The Financial News of Malaya)

An intelligent traveller arriving in Singapore, or Penang, whether by sea, air, rail or road, could not fail to be impressed by the volume of shipping, great and small, which immediately confronts the eye. The Londoner is in the main quite unaware that he is living in one of the greatest ports in the world. The Singaporean, on the other hand, lives in an atmosphere of shipping. As he looks out from his office, his club, his hotel, he finds himself face to face with its manifold activities. He is an expert on flags and funnels, and no mean critic of ship design and equipment. The intelligent traveller who wishes to share this knowledge will reasonably ask why is there such a concourse of shipping here, where does it all come from, and what are the facilities available for it? It is the purpose of this article to give briefly some answer to these very natural questions.

A glance at the map of the Far East gives an immediate answer to the first question. Malaya lies all along the narrow waterway known as the Straits of Malacca, and thus commands the high road from the Indian Ocean to the China Sea, which is the route from Europe or America to the Far East.

For centuries the importance of the Straits has been recognized, and the ancient city of Malacca lying roughly half way down the Straits was the great mart where traders met from India, Burma, China, Moluccas, Celebes and Arabia, and many other places, to deal in ivory, spices, silks and porcelain, gold and precious stones, and all the other articles of ancient commerce. Of European nations, the Portuguese were the first to turn envious eyes on Malacca from their commercial bases in India, and they captured it in 1511. A hundred years later, when Portuguese maritime supremacy was waning, and the Dutch pioneers were spreading eastward, particularly in the area now known as the Netherlands Indies, Malacca became a liability to its masters rather than an asset. After repeated sieges and surprise attacks it eventually capitulated to the Dutch in 1642. With that it lost much of its glory. The Dutch used it not as a center of trade but as a base from which to support the trading monopoly which they were building up in the Netherlands Indies.

British Settlement

Meanwhile England too was turning her attention to the Eastern trade, but the early history of her efforts is one of factories founded and abandoned, with little permanent penetration in the area. The East India Company was heavily committed in India, and the Home Government pursued a policy of a strong Holland as a buffer against Continental enemies. However, in 1797, under urgent pressure from that great pioneer, Captain Light, the company was induced to occupy Penang, which with the older settlement of Bencoolen in Sumatra became the company's chief post in Malaysia. The new settlement was inaugurated with a flourish of trumpets, and given an imposing and expensive staff of officials, but it proved a considerable disappointment, and but for the Napoleonic wars might well have sunk back into insignificance. But the overrunning of Holland by Napoleon soon resulted in the capture by us of the Dutch possessions in the Far East, whereby we acquired not only Malacca but Java, and its various dependencies. It is true that the Treaty of Amiens in 1814 gave all this back to Holland, but the interest of England had been aroused, and the enormous potential wealth of the area had been appreciated; and not least by Stamford Raffles, formerly of the Penang Establishment, and later Lieutenant-Governor of Java during our occupation. In spite of much opposition, the story of which is told elsewhere, he was allowed in 1819 to found Singapore, and what is more important, allowed to keep it. In 1824 an Anglo-Dutch Treaty was negotiated whereby the spheres of influence between British and Dutch were separated by a line drawn roughly down the center of the Straits of Malacca. While giving up our interests in Sumatra and elsewhere, we became the only Power interested in what has since become British Malaya.

Supremacy of Singapore

Singapore, as Raffles in his clear vision readily foresaw, commanding, as it does, the entrance to the Straits of Malacca, was the ideal place at which to create a "free port" to break the monopoly which the Dutch, as soon as they regained control of their Eastern possessions, immediately endeavored to re-introduce. No Customs duties were imposed at Singapore, and the charges on shipping, native or otherwise, visiting the port were fixed at an almost nominal figure. Within a few months the place was a hive of industry. Native boats full of valuable local produce, with orders for European goods in exchange, flocked to it from all surrounding countries, Siam, Indo-China, China itself, and, notwithstanding all the efforts of the Dutch to check the trade, all the adjacent Dutch islands. Singapore's greatness, and to a lesser extent Penang's, were built up on this original entrepôt trade.

Much has happened since then; the cutting of the Suez Canal, which shortened the sea voyage from Europe and America so drastically, and the invention and perfection of the steam engine, which reduced the length of voyage even more, have been two external factors which have brought immense prosperity to Malaya. This was further augmented by the introduction of rubber. Another factor of great importance, partly beneficial and partly detrimental to Malayan prosperity, has been the development under foreign or nationalistic stimulus of adjoining countries. For many years after its foundation Singapore remained unique, and the traders of the East congregated there as the one free market in the area. Since then the Netherlands Indies have grown into a self-contained Empire, with many great ports and large national fleets. Siam, Indo-China and China have developed on their own respective lines and built their own great ports. Japan, from being an almost unknown territory in the far distance, has become a great Power and a great industrialist nation.

While, therefore, Malaya is now almost surrounded by tariff walls and self-supporting countries, and has thereby lost much of her original exchange trade, she yet benefits immeasurably from the greatly increased commercial activity of the Far East as a whole, and her geographical position makes her the center of a vast transhipment trade. Anyone looking out on the harbor from any of the stately buildings on the waterfront will see before him, lying at anchor in the Outer Roads, great cargo liners surrounded by lighters, while busy launches and motor sampans hurry backward and forward threading their way through the stream of heavier native twakows and tongkangs filled with merchandise—an animated and picturesque scene full of color in the strong tropical sunlight. Any day there will be ships representing half a dozen world-renowned shipping companies busily loading tin and what is known in Mincing Lane as "Straits Produce," that is copra, rubber, gum, sago flour, pineapples, pepper and all the rest.

Inside the breakwater in the Inner Roads lie innumerable small ships which fetch and carry for these ocean liners. These small vessels, many of specialized design, vary from 50 tons net register up to 3,000 tons or more, and operate a network of miniature liner services in conjunction with their ocean counterparts. This transhipment operation can perhaps better be seen two miles westward along the waterfront, where lies the imposing range of concrete wharves owned by the Singapore Harbor Board, a semi-Government concern managed by a board composed chiefly of leading business men and a chairman of unusual ability and enterprise. There are over 11,000 feet of deep-water berths, and these are now in process of being extended by a further 3,000 feet. Here even such large ships as the *Empress of Britain* (42,000 tons) can safely lie. A visit to the wharves any day will produce a memorable panorama of flags and funnels, two or three Blue

Funnels may be, for U.K., New York or the further East, a P. & O., a Glen from Europe, a couple of B.I.s, and an Indo-China vessel from Japan, Calcutta or Rangoon, Dutch, German, French and Japanese mail boats, a Dane or a Norwegian, a Dollar boat from San Francisco, an Ellerman vessel, and perhaps a Burns Philp liner from Eastern Australia, or an O.S.K. vessel bound for Africa and South America. Among them will be found at intervals the white hulls and blue, white and black funnels of the Straits Steamship Co., or black hulls and yellow funnels of the Dutch K.P.M. These are the two chief coasting companies. But there are many others —British India, Indo-China, China Navigation, Sarawak Steamship, Siam Steam Navigation and so on—whose activities are sufficiently obvious from their titles. These fleets form the connecting links whereby Sarawak and London, Bangkok and Valparaiso, Mergui and Sydney, Pontianak and New York, Calcutta and Fremantle, to take half a dozen examples at random, can be joined in one continuous service through the medium of Singapore. For this immense transhipment trade, the chief function of the port, the Board provides special facilities.

The Lesser Ports

But while Singapore overshadows the other Malayan ports, these too require some mention. Penang, at the other end of the Straits of Malacca, performs on a smaller scale the same functions as Singapore, and it is the gate to Northern, as Singapore is to Southern Malaya. The wharfage is limited, and various proposals have been considered for extension either on the island or on the mainland. Some years ago an imposing concrete wharf was erected at Prai, on the opposite mainland, at a cost of some £3,000,000, but inadequate attention was paid by the authorities to silting difficulties, and the wharf is not suited to the draft of vessels commonly visiting the port. Malacca is the third port of the Straits Settlements, and is shorn of most of its ancient glory. It is an open roadstead, and the number of ocean vessels which call there is not great, the majority of its rubber (the principal export) being sent via Singapore. The chief port of the Federated Malay States is Port Swettenham, and this has grown in importance considerably in the last few years. It is sited inconveniently for modern large cargo vessels, and schemes for moving the port to a more attractive position, where deep water is available, have for many years been under consideration. Undoubtedly this will come in time; the Customs duties existing in the Federated Malay States (the ports of the Straits Settlements are "free") force an increasing flow of cargo for Central Malaya through this gateway.

In addition to the four major ports, there are a large number of smaller ports on the East and West coasts of Malaya, suitable only for coastal craft by reason of their position up rivers or behind shallow bars. Many of these are owned by the F.M.S. Railway, and there has been a regrettable tendency on the part of the railway to divert where possible the traffic which formerly passed through these ports, and encourage by special rates the longer haul to Singapore, or to Prai on the mainland opposite Penang. But many of these ports still play a not unimportant part in the general trade.

A Natural Shipping Center

Of the extent and value of Malayan seaborne trade, the following statistics will give an eloquent picture.

In 1935 the net tonnage of merchant vessels over 75 tons engaged in overseas trade, arriving at and departing from the four principal Malayan ports, amounted to nearly 50,000,000 tons, while coasting vessels and native craft exceeded 3,500,000 tons. The value of British Malaya's trade overseas, excluding, that is, coastal operations, amounted in that same year to approximately £116,000,000. No further facts are necessary to explain why Singapore and its sister ocean ports are so thronged with shipping.

Such is the position to-day. The question remains, what will be the future? It seems impossible to suppose that Singapore will ever lose that special value, which she has inherited directly from her geographical position. It is true that air transport has developed rapidly and will surely develop more rapidly in years to come. But one questions whether this will represent any serious threat to carriage by sea. The loss to shipping, whatever it may represent, will most likely be more than offset by indirect gains derived from more rapid inter-communication. The cutting of the Isthmus of Kra at the top of the Malay Peninsula (to short-circuit Singapore) is a bogey often invoked, but impartial examination suggests that it is nothing more serious than a bogey.

The East is progressing rapidly. Malaya itself is only partially developed and possesses great potentialities. The intensely nationalistic policies and high tariffs so popular to-day must inevitably give way at last to a saner policy of international good will and the maximum exchange of goods between nations. All this should mean more trade for Malaya and the ships which call there. We can surely, then, be confident that Singapore will remain the great clearing-house that she is to-day, handling in the future an even larger volume of traffic, and with the added distinction of being the greatest naval outpost of the Empire. Penang, Port Swettenham and, one hopes, even the smaller ports of the coast should continue to grow in their turn to fulfil their appropriate functions, so that the high hopes of even Singapore's most sanguine founder, Raffles, already far exceeded, may well be surpassed as much again in the years to come.

Conditions in Soviet Russia To-day

(Continued from page 169)

I would like to ask him what has become of the strongest political party and government in the world of which he once boasted.

Hostage System

One of the tragic phases of the reign of terror is the application of the so-called hostage system during the examination of state prisoners.

Under this system defendants have been told in effect that in the event they refuse to confirm in the public trial the procurator's previously prepared statements, innocent members of their families will also be indicted as those involved in given cases.

This threat has proved 100 per cent effective in bringing about the results desired by the Kremlin leaders. As readers will recall, Rakovsky, famous fighter for the cause of the revolution, during a series of recent trials of the "Rightist and Trotzkyite bloc," made a reportedly false statement that he had acted as a spy in the interests of Japan and Britain.

Krestinsky, another defendant involved in the case, reversed his previous statement overnight, accepting the procurator's charges against him.

It is evident that the two defendants denied themselves justice for fear that otherwise members of their families would be dragged into court under false charges.

Such fear was common among all the defendants involved in the "Rightist and Trotzkyite bloc" trial, I learned.

This point must be borne in mind when estimating the future course of affairs in the Soviet Union.

German Planes for Manchuria

The Manchuria Air Transport Company has purchased two Heinkel transport planes of the 116 type representing the last word in aircraft engineering. These two planes will be flown from Berlin to Tokyo via the southern route by the two Japanese pilots. The Heinkel planes are low-winged monoplanes made entirely of duraluminum and having a seating capacity for seven passengers, and a cruising radius of 4,500 kilometers.

The Lighting of the Indian Aerodromes

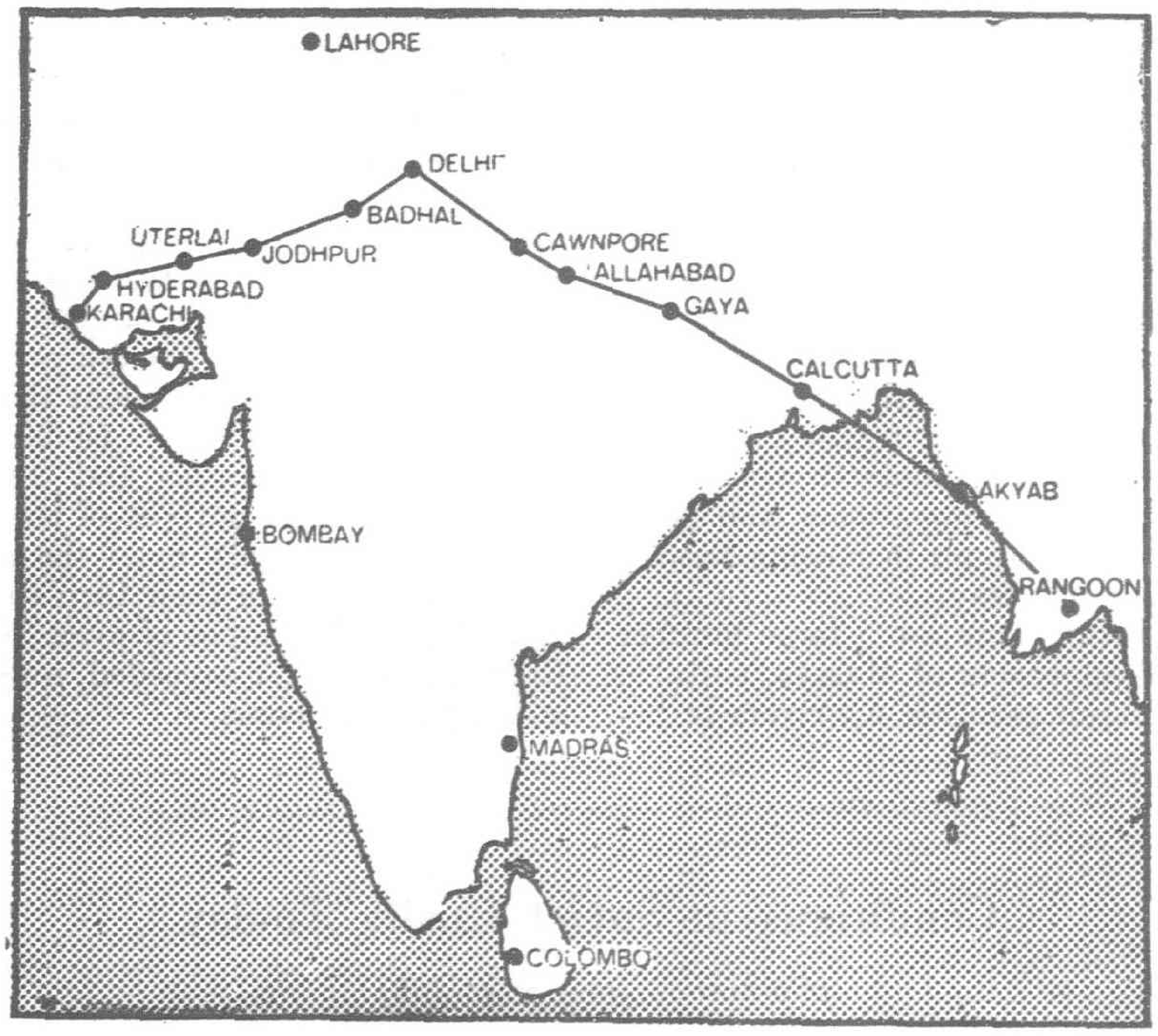
By G. S. ROBINSON, M.A. (Cantab), Exterior Lighting Department of The General Electric Co., Ltd.

(From the G.E.C. Journal)

CONSIDERABLE progress has been made by the Government of India in the constructing and equipping of the aerodromes on the portion of the England to Australia air route between Karachi and Rangoon.

Below is shown a sketch map of India showing the actual air route and landing grounds concerned. The distance between Karachi and Rangoon is approximately 2,400 miles, which is about one-third of the total distance from London to Singapore. The project, which includes the installation of aerodrome lighting equipment at all landing grounds, thus materially assists the scheme of day and night flying which it is desired to establish throughout the route. While the main aerodromes are naturally near important towns, some of the emergency landing grounds are peculiarly inaccessible and present unusual difficulties in the erection of electrical equipment.

In this article it is proposed, first, briefly to outline the events which led to the development of the present scheme; secondly to describe the scheme itself, and lastly to give some details of the actual apparatus and its installation.



Map of India showing the aerodromes between Karachi and Rangoon on the England to Australia air route

Original Air-Mail Service

The original air service from England to India began in 1929, when the Indian Air Mail first reached Karachi. Thence mails were carried by rail all over India, and while it took seven days to fly from London to Karachi, it took a further three days for mails to reach Calcutta by train, thus taking a total of eleven days, allowing for collection and delivery.

Shortly after this, however, the Delhi Flying Club arranged to carry mails from Karachi to Delhi, and this was carried out with commendable regularity. It may be mentioned in passing that the Delhi Flying Club is probably the only concern of its kind which has ever been awarded a Government mail contract.

Unfortunately, the club soon found itself unable to carry on the contract, and it was not until 1933 that Indian Trans-continental Airways, a concern owned jointly by the Government of India and Imperial Airways, extended the route to Delhi and then Calcutta.

In the meantime, the Government and certain private individuals had become aware of the immense advantages aviation could provide in India. When it is realized that India has an area as large as that of all the countries of Europe added together except Russia, and that industrial centers are few and far between, these advantages are at once apparent.

As a result, in April, 1931, the Government of India issued tenders and actually placed a contract for lighting the route between Karachi and Delhi, but the industrial depression intervened and for reasons of economy, the scheme was temporarily abandoned. It was not until January, 1935, that the scheme was revived and the present Karachi-Rangoon scheme was initiated. In the meantime, aerial traffic had increased enormously, the Imperial Airways service running bi-weekly each way to Calcutta and weekly to Singapore, and the K.L.M. and Air France companies providing weekly services.

Up to this time, the only properly equipped aerodrome was at Jodhpur, a native state mid-way between Karachi and Delhi, where lighting equipment had been installed by the state itself early in 1934. The result was that all the three air lines made a stop at Jodhpur, the lighting proving of great value when aircraft arrived late due to head winds or other causes.

New Aerodrome Lighting Scheme

The scheme originally devised by the Director of Civil Aviation in India not only included night landing equipment, but also the extension of landing grounds, the improvement of approaches, together with new terminal buildings, new hangars and radio equipment for the more important grounds.

The most important landing grounds on the route, namely, Karachi, Delhi, Cawnpore, Allahabad and Calcutta, were each to have new buildings and hangars, together with landing floodlights, beacons, illuminated wind direction and velocity indicators, boundary lights and obstruction lights. Of the remainder, flood lights were to be installed at Bombay, Gaya and Akyab, and at these and at Uterlai, Hyderabad (Sind) and Rangoon, wind indicators, boundary lights and obstruction lights were required, the Directorate arranging on the latter three grounds to use mobile floodlights which they already possessed. In addition, all cabling, switchgear and four sets of duplicate generating equipment had to be installed.

The equipment employed throughout the system was manufactured and supplied by the G.E.C., and is, as far as possible, indentical for each ground so that stocks of spare parts may be kept to a minimum.

Boundary Lights

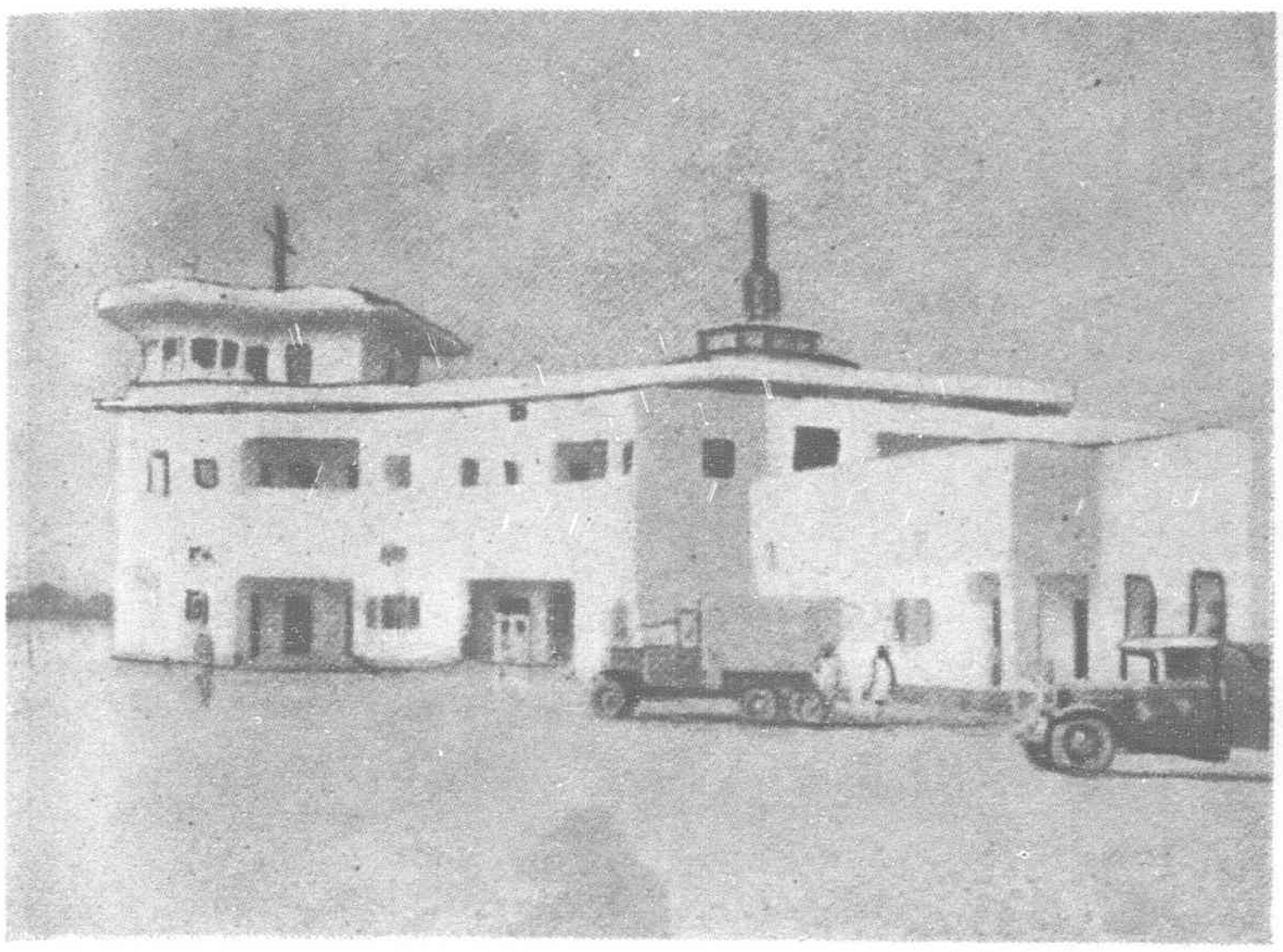
The boundary lights are all of the Cone type each fed by a small transformer at 6.6-volts from a series ring main, the latter taking its supply from a main transformer. This method not only ensures that every lamp burns at the same efficiency, but affords a considerable saving in the quantity of cable required, as only a single core ring is necessary. A total of 384 boundary lights is used throughout the route.

Obstruction Lights

All obstruction lights are in the form of "twin" fittings to ensure that in the event of a lamp failure at any point, the obstruction is still marked.

Wind Direction Indicators

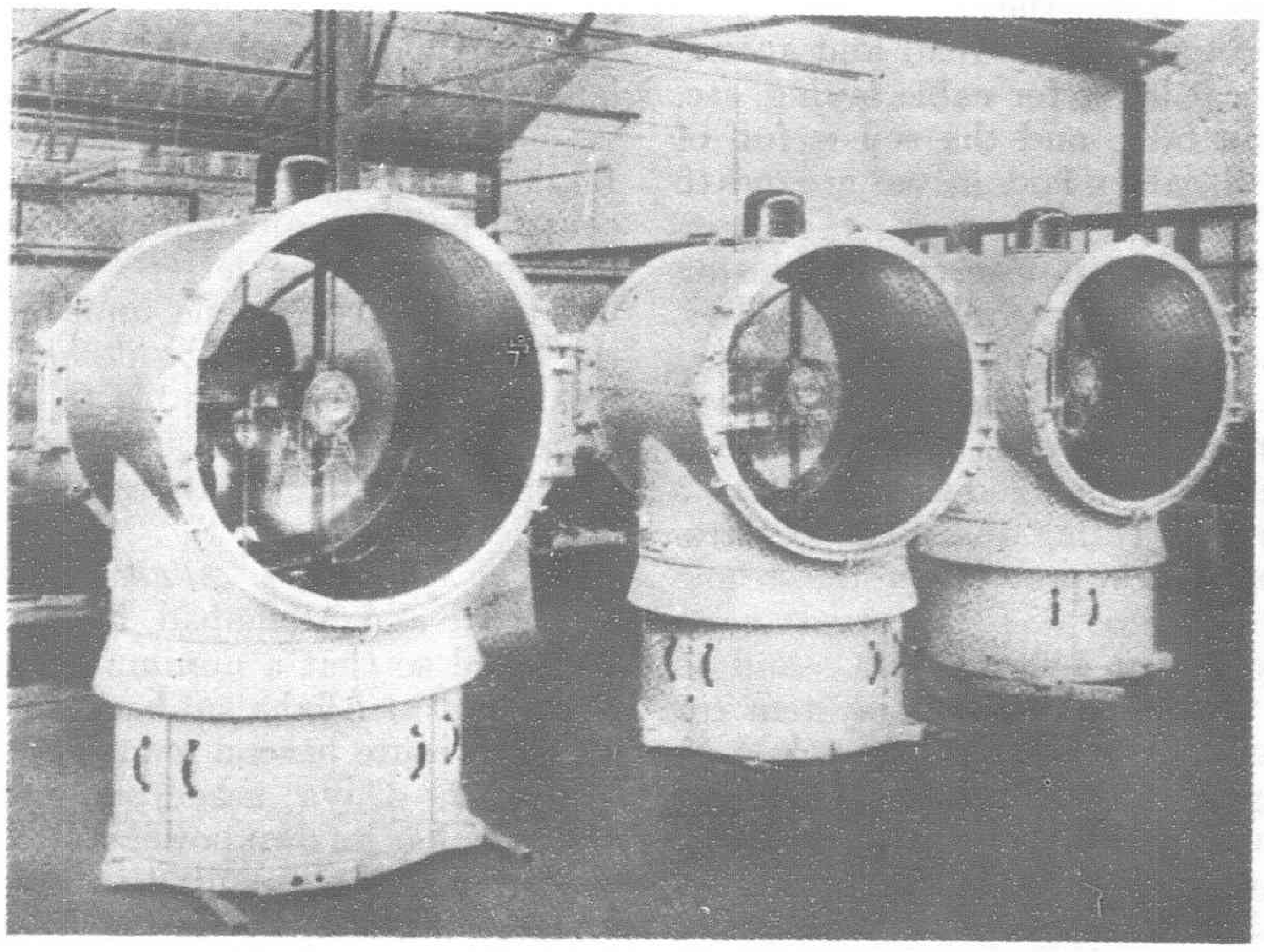
The direction of the wind on the landing ground is indicated by large indicators each fashioned in the form of a T, the dimensions of each limb being 20-ft. by 20-ft. The top side is illuminated by forty 15-watt lamps. Such an indicator is clearly visible to a pilot



Control building at Delhi, with 3 kw. neon beacon on roof

at an altitude of 1,000 feet on a clear night. On each indicator is a weighted arm whose function is to return the indicator automatically to the best landing direction when the wind velocity is less than three miles per hour.

An illuminated wind velocity indicator is installed alongside each of the direction indicators and consists of a small windmill having 4-ft. diameter vanes which are rotated by the wind and drive a vertical shaft on which is mounted a centrifugal governor mechanism. The rising of the governor arms rotates a series of cams which, in turn, tilt mercury switches. These control the electricity supply to an electric sign of the numerical type, which lies flat on the ground. Various combinations of mercury switches light up one of the figures 0, 5, 10, 15, 20 and 25, thereby giving a direct reading of wind velocity.



Three of the 36-in. rotating beacons used on the Indian air-route

Landing Floodlights

Three types of floodlights are employed for different conditions, each being rated at 9 kw. and using optically worked parabolic glass trough reflectors and line-filament, horizon type lamps. The three types in use are (*a*) a nine-lamp floodlight, (*b*) a three-lamp floodlight and (*c*) a three-lamp combined floodlight beacon. While it is not intended to employ shadow bars for night landing, types (*b*) and (*c*) mentioned above are so fitted in case of emergency. All these floodlights can be connected to form a balanced load across three phases. Altogether, eight nine-lamp floodlights, one three-lamp floodlight, and two floodlight beacons have been used along the route.

Rotating Route Beacons

Rotating route beacons installed at Karachi, Cawnpore and Allahabad, are of a new type and employ a 50-volt 1,500 watt grid filament lamp in conjunction with a special reflector, whose contour in one plane is a parabola, and an ellipse in the plane at right angles. This gives a main beam whose horizontal spread is about 12 degrees and whose vertical spread is about three degrees. The intensity is of the order of one million candle power. This beam is directed upwards at an angle of one degree above the horizon, and aircraft flying at 3,000 feet can thus receive a light signal 35 to 40 miles away. Recent reports indicate that on clear nights, the beacon at Allahabad has been sighted by aircraft at a distance of 90 miles. A refractor is also incorporated which redirects some of the main beam at higher angles, in order that during bad weather the beacon may easily be discernible at various heights. A 250-watt red identification light, mounted on top of the beacon, is arranged to flash a Morse letter indentifying the aerodrome. An automatic lamp changer brings into focus a spare lamp should the main lamp fail, at the same time giving a suitable warning to the ground staff.

Control of Equipment

At Karachi, Delhi, Cawnpore, and Allahabad (and also at Jodhpur) special control desks have been placed in the control tower. These desks control all night landing equipment, and by means of an illuminated dial which is operated by the wind direction indicator, the direction of the wind is indicated to the control officer, so that he can ascertain which floodlight to use for landing. At other grounds, where there is no control tower, the control equipment comprises standard ironclad switchgear which is mounted on the wall of the hangar or power house. At Calcutta, Akyab and Rangoon, a wind indicator of the type just described is incorporated.

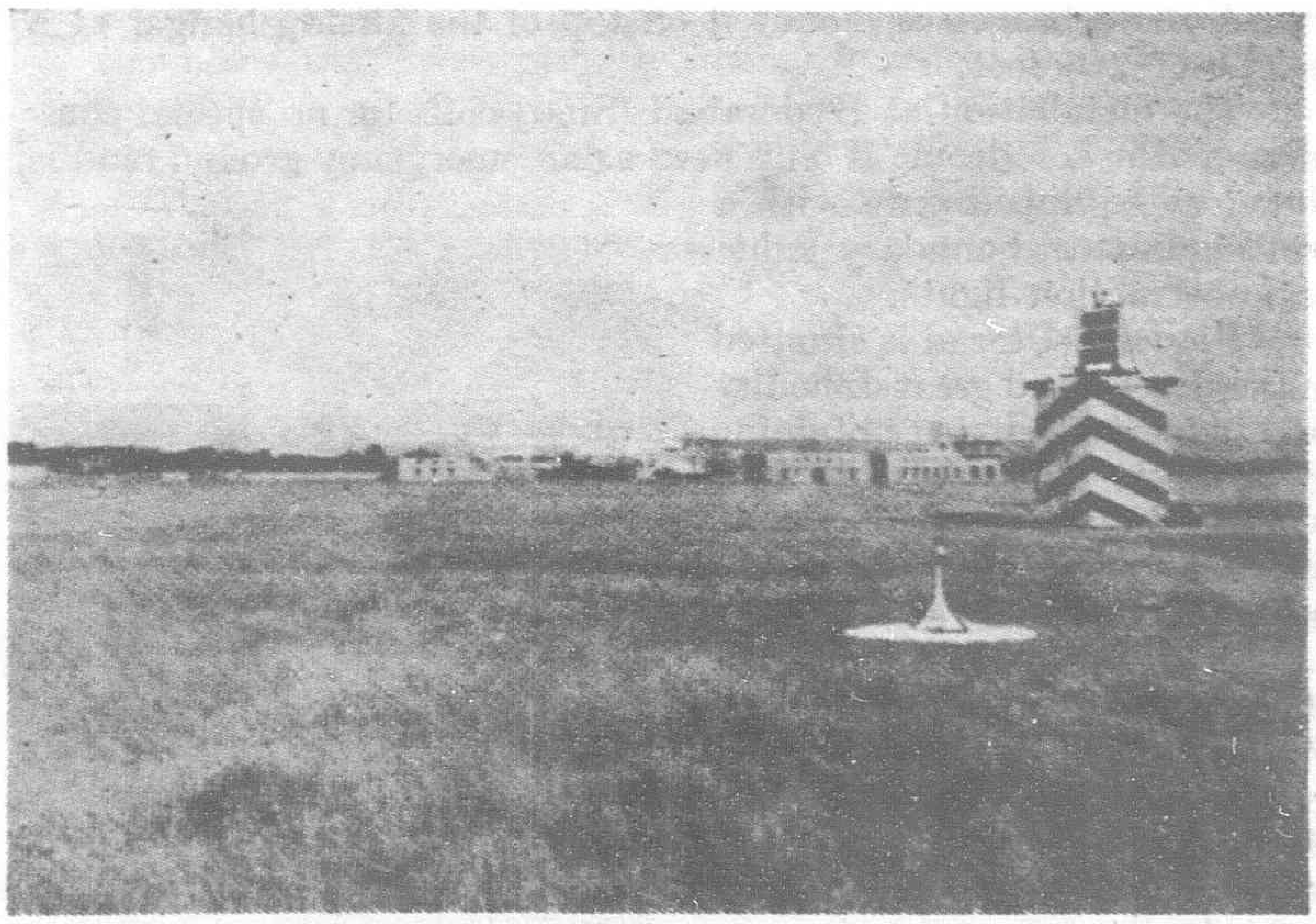
Generating Plant

No electric supply was available at Uterlai and Gaya, and at these aerodromes, duplicate generating plant has been installed. The power houses are brick buildings, with flat roofs. At Uterlai, the plant consists of two 8 h.p. Lister crude oil engines each driving a 3.5 kw. 400/230-volts three phase, 50-cycle alternator, while at Gaya, where there are floodlights, two Lister engines each drive a 17 kw., 400/230-volts three phase, 50-cycle alternator. As it is only necessary to run one set at a time, no synchronizing gear is necessary, and the control panels are therefore simple in design. The switchgear is arranged so that it is impossible for the native in charge to start up both generating sets together.

Installation

The whole of the installation work was undertaken by the Calcutta Branch of the General Electric Co. (India), Ltd., a subsidiary company of the G.E.C.

The rates for unskilled labor vary enormously throughout India, as also do the facilities for obtaining transport of material to site from the railway, local accommodation for supervisors and men, and in the case of Uterlai supplies of food. In order to obtain an adequate

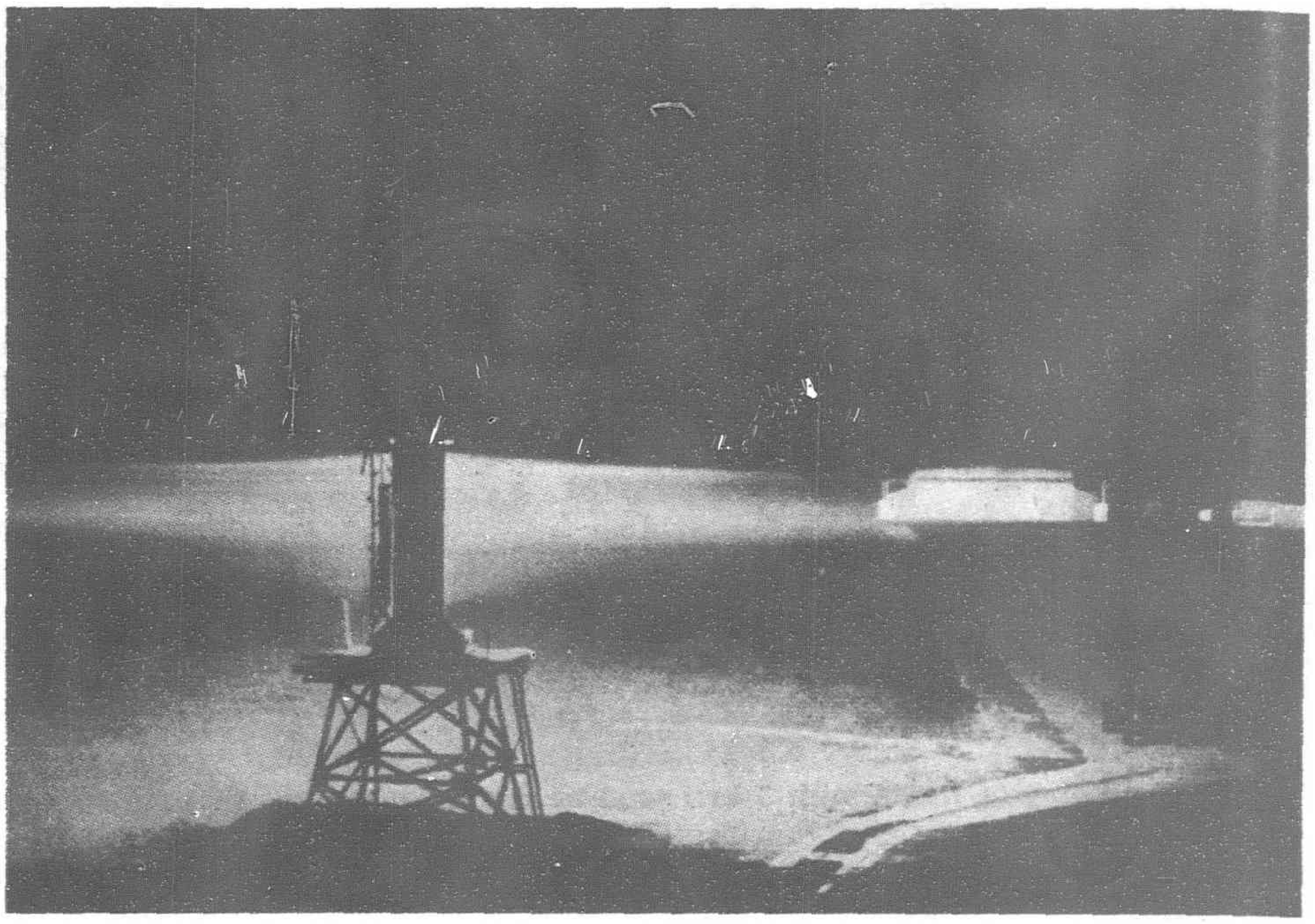


Floodlight on structure and cone boundary light at Jodhpur.
The control building is in the background

knowledge of these local conditions, a complete survey of every landing ground was made.

Later on, when the question arose of the shipment of material from this country, it was necessary in most cases that the large amount of miscellaneous gear required at any one aerodrome should be sent in one consignment, as it would obviously be uneconomic to send gangs of men to and fro over distances of several hundred miles, to the various aerodromes because some of the material was not on site. When it is realized that twelve different works of the G.E.C. alone were directly concerned with the manufacture of the equipment, it will be seen that elaborate transport arrangements, and internal co-operation between works was an essential part of the scheme.

Karachi.—Turning now to details of the actual installation, it will be seen on the sketch map that Karachi is situated at the entrance of the air route to India, and branch air routes start thence to Lahore, Bombay and Madras. Karachi is probably the most important aerodrome in India from the point of view of traffic, and a very comprehensive lighting scheme has been installed.



9 kw. floodlight beacon installed at the Dum-Dum aerodrome, Calcutta

The aerodrome is at Drigh Road, about seven miles from the city and nine miles from the Docks. All equipment had to be brought up by road and special arrangements made for obtaining local labor for cable laying, etc. The climate is humid, but little rain falls, and the soil is full of saltpetre, making it necessary for all cables laid in the ground to have special protection.

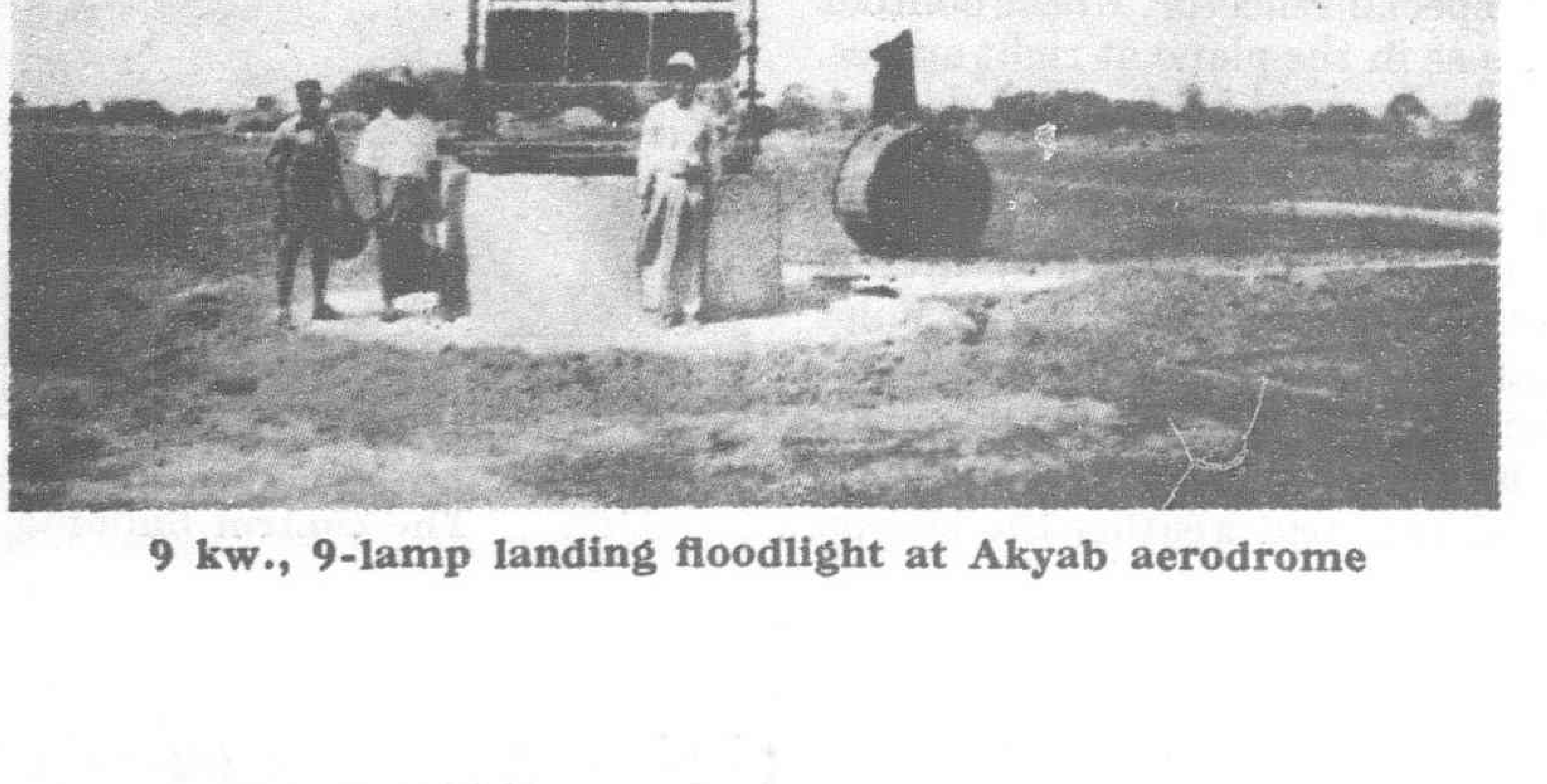
Air traffic had to be maintained without interruption during the whole time the installation was being undertaken (This applied to every other airport on the route). Cables which crossed the landing ground, had therefore to be laid in sections, one section being completed before the next was started.

Three 9 kw. nine-lamp floodlights were installed so that aircraft could land in any direction without subjecting the pilot to glare. Each one of these floodlights illuminates practically the whole landing ground.

The available electricity supply was at 440-volts D.C., and as an A.C. supply was necessary for the boundary light system (in view of the great saving in cable effected by a 400/230-volt A.C. distribution more than outweighing the capital cost of installing twin motor alternator sets) the whole of the supply to the night landing equipment was converted to this A.C. system. The output of each of the sets is 20 kw. and the set to be used is selected by means of a changeover switch in the intake room. Starting is effected by a push button in the control tower, which operates a solenoid operated multiple contact starting unit. The alternator panels are equipped with frequency meters and feed a contactor type switchboard for the outgoing circuits, which is also controlled from the desk in the control tower.

A route beacon is mounted on top of the airship hangar at a height of 280 feet.

The installation at Hyderabad (Sind) calls for no special comment as the aerodrome is only used as an emergency ground, and is therefore equipped only with a wind indicator, boundary lights and obstruction lights.



9 kw., 9-lamp landing floodlight at Akyab aerodrome

Uterlai.—Uterlai is situated in the desert, and great difficulty was experienced in obtaining local labor. The erection staff had to make special arrangements to obtain food and drinking water, and although a railway runs near the ground, there is only one train a day. While the installation of a small generating plant and cabling would normally have presented few difficulties, the same work carried out 300 miles from a town in a locality abounding in snakes and scorpions was beset with troubles, which were not in any way eased by the strange language of the local inhabitants.

Delhi.—No equipment was installed at the aerodrome at Badhal, and the next ground was therefore Delhi. An up-to-date control building and hangars are installed here, and a 3 kw. neon beacon flashes the letter " D " from the summit of the control building. There is one unusual feature on this ground, namely, the Saf-dar-jang tomb, a domed marble building 90 feet high. It was considered inadvisable to place an ordinary obstruction light on top of this, in view of the probability of offending local religious feeling. The dome is therefore illuminated in red by four " Osira " floodlights.

Cawnpore and Allahabad.—As regards the aerodromes at Cawnpore and Allahabad, the former is to be further extended and improved so that a minimum of lighting has so far been installed, while that at Allahabad has three 9 kw. nine-lamp floodlights and a 1½ kw. route beacon mounted on top of the hangar.

Gaya.—Gaya aerodrome—midway between Allahabad and Calcutta, has its own power station, and a 9 kw. three-lamp floodlight beacon has been mounted on the flat roof. This unit which rotates at 12 r.p.m. can, by an ingenious method of tilting the reflectors, throw a beam of nearly 1½ million candles at an angle up to 30° above the horizontal. When aircraft come in to land, the beam is depressed and illuminates the landing ground. In addition, there is a 9 kw. nine-lamp floodlight for use when the wind is blowing in the other direction.

Calcutta.—At Dum-Dum Aerodrome, Calcutta, a 9 kw. three-lamp floodlight beacon had already been installed. This has been connected up to the new switchboard, and a further 4½ kw. floodlight originally at Karachi, has also been installed here.

Akyab.—Akyab is on an island on the Burma coast, two days by boat from Rangoon. This proved to be one of the most difficult grounds to equip, owing to its inaccessibility, and to the excessive rainfall which exceeds 200 inches per year. Two floodlights are employed here, and runways are necessary for use during the monsoon.

Rangoon and Bombay.—The aerodromes at Rangoon and Bombay call for little comment, except that at Bombay, obstruction lights have been used on 120 foot towers to light a gap cut between palm trees fringing part of the ground Approaches and take-offs in this direction have to be made through this gap.

Is Japan Constructing the Kra Canal?

Is Japan constructing a canal through the Kra Isthmus, in Siamese territory? For years, the world has heard rumors, some with a tone of authenticity, others ridiculously impossible, to this effect. The charges and counter-charges all were made on paper. None, apparently, bothered to investigate.

To-day, however, it appears that these rumors have been safely laid to rest, and the wild stories of a gigantic engineering project by Japanese in Siam have been blasted. It took Mr. James A. Mills, Associated Press correspondent, to view the situation first-hand and report: "I am able to declare that the story from beginning to end is an absolute fabrication; Japan is not constructing a strategic maritime canal for the Siamese Government."

The Bangkok correspondent of the *Straits Times* echoed the findings of Mr. Mills. He recently wrote:

"Most of the stories written about the Kra Canal have come from the inventive pens of American copy tasters. In no one case have the visions of the 'armed forces of Japan in the city of Kra;' of 'Japanese blasting the rocks away at Victoria Point;' or of the airwoman Bonney's mythical Siamese island of Bang Bang, been supported by photographs. To create this sensation of the Kra Canal and then to burst it has been the supreme effort of American journalists. Siam has very rightly said ever since this Kra canard has been in the news, why do not these stunt writers walk from one side of the peninsula to the other, and describe with pen and camera, what they see?

"Surveyors, engineers, experts in canalization have done this journey, why should not story writers and sensation mongers have to make the same pilgrimage and see—before putting their pens to paper?" The challenge has at last been taken up. Mr. J. A. Mills of Associated Press, came to Bangkok determined to see this Kra boost through. He collected all the information he could locally, and armed with maps and surveys, left Bangkok for Chumporn and then crossed the peninsula to Victoria Point. He has drawn blank.

No Japanese Present

"No blasting (of rocks, at any rate), no armed forces from Nippon, occupying all the accommodation in the 'city of Kra' to the detriment of transpeninsula tourists; all quiet and ordinary—with the exception that while in years gone by the overland part of this transpeninsula journey had to be done on elephant back, the construction of a road now enables the traveller to make the journey by a bus! Mr. Mills may, by now, be in Penang, but he will find it difficult to get the copy tasters to eat their words now that he has exploded their 'hot air' story. The stronger Mr. Mills denounces his countrymen for their share in this ignoble boost, the more Siam will be grateful."

And now for the sequel:—

On March 26 *The Bangkok Times* mentioned the presence in Bangkok of Mr. James A. Mills, of the Associated Press, and the interest he was taking in the tales that have been finding currency about the Kra Canal. He had seen the maps we published, and these set him thinking. He decided that the only way to end, or confirm, these reports was to visit the Kra area. That he did, and this in effect is the message he sent to the Associated Press from Penang on March 31:—

After hundreds of miles of travel by train, elephant, automobile, motor launch and afoot, I have passed through the Kra isthmus, where Japan is alleged to be constructing a strategic maritime canal for the Siamese Government; and I am able to declare that the story from beginning to end is an absolute fabrication. From Chumporn on the Gulf of Siam side to Taplee on the Bay of Bengal, which covers the entire Kra district, I failed to find any trace of a single Japanese officer, or of native workmen. Not a single stone has been turned up; not a single spadeful of earth has been disturbed; not a single sentry was observed. Instead of a canal your correspondent found a forest of coconut trees, full of chattering monkeys. The peasants in the Kra district expressed blank amazement when your correspondent mentioned the subject of the canal. The district is largely infested with elephants and tigers; and the hilly jungle presents insuperable difficulties in the way of constructing any canal.

Project is Unfeasible

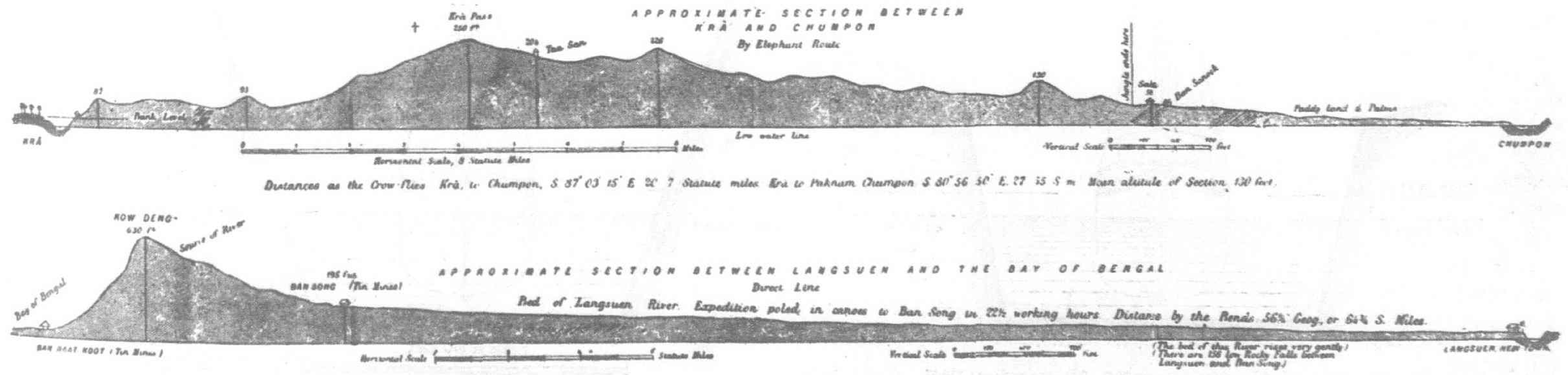
The American, British, and French Government Advisers in Siam pronounce such an enterprise to be utterly unfeasible, both commercially and strategically, emphasizing that two-thirds of the isthmus consists of solid rock. The Kra district has not been proclaimed a military zone, as has been reported abroad. The trains are not shuttered, and automobiles are permitted to circulate freely. I personally took scores of photographs unhindered. Equally mythical are the successive reports that Japan is exercising a dominating military, political, and commercial influence on Siam. "Throughout the entire Government only a single Japanese expert is employed, and he is a minor agriculturist, experimenting in cotton. The last Japanese officer was engaged in the Siamese Army two hundred years ago; but to-day there is not a single Japanese officer in the whole of Siam." That is what the Premier told me.

The Minister for Foreign Affairs said to me:—"Siam will never impair her friendship with the United States, England, France, or other Powers, or jeopardize her own independence by awarding such a contract as the Kra canal to Japan or to any other nation."

The Plans Once Considered

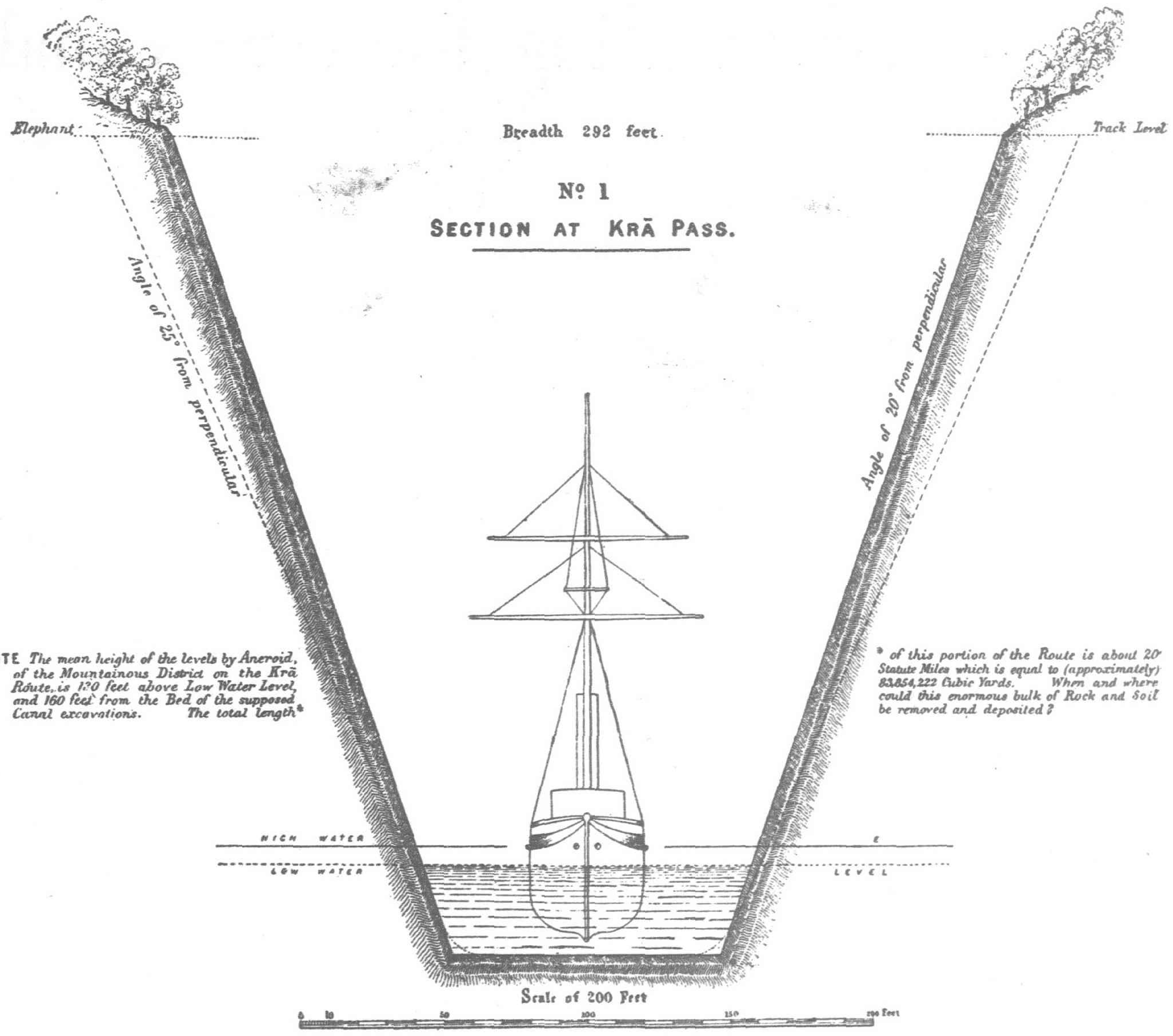
However, the fact that no nation now is engaged in the construction of the Kra Canal does not mean that it was not at one time considered a feasible project. It is interesting to recall some of the plans that were projected some fifty-five and seventy-five years ago.

It was from January 16 to April 4 in 1883 that Commander A. J. Loftus, F.R.G.S., then in the Siamese service, accompanied a party sent by the French Government on a survey expedition


APPROXIMATE SECTION BETWEEN KRÀ AND CHUMPON
By Elephant Route
Krà Pass 250 ft
87
93
204
126
130
Bank Level
KRÀ
Low water line
Horizontal Scale, 8 Statute Miles
Vertical Scale
Jungle ends here
Sala
Ban Sawek
Paddy land & Palms
CHUMPON
Distances as the Crow Flies Krà to Chumpon, S 87° 03 15 E 20 7 Statute miles Krà to Paknam Chumpon S 80° 56 50 E 27 55 S m Mean altitude of Section 130 feet
ROW DENG 630 ft
Source of River
Bay of Bengal
195 feet
BAN SONG (Tin Mines)
BAN ... KOOT (Tin Mines)
APPROXIMATE SECTION BETWEEN LANGSUEN AND THE BAY OF BENGAL
Direct Line
Bed of Langsuen River Expedition poled in canoes to Ban Song in 22½ working hours Distance by the Rends 56½ Geog. or 64¾ S. Miles
Horizontal Scale
Statute Miles
Vertical Scale
(The bed of this River rises very gently) (There are 156 ... Rocky Falls between Langsuen and Ban Song)
LANGSUEN NEW TOWN

The Kra Canal Plan, drawn to scale—the surveys of many years ago

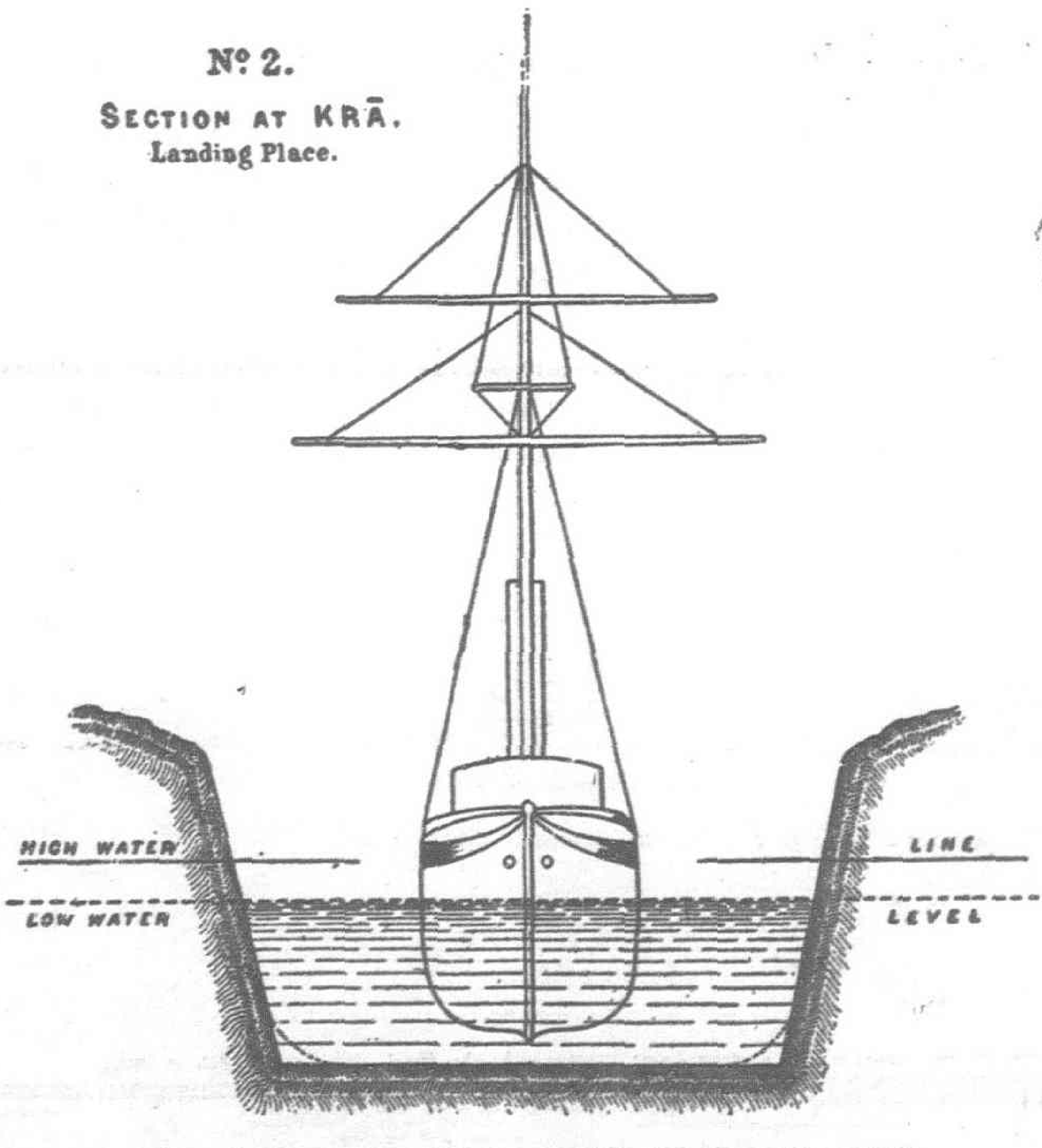
KRA CANAL PLANS OF 55 AND 75 YEARS AGO



No 1
SECTION AT KRĀ PASS.

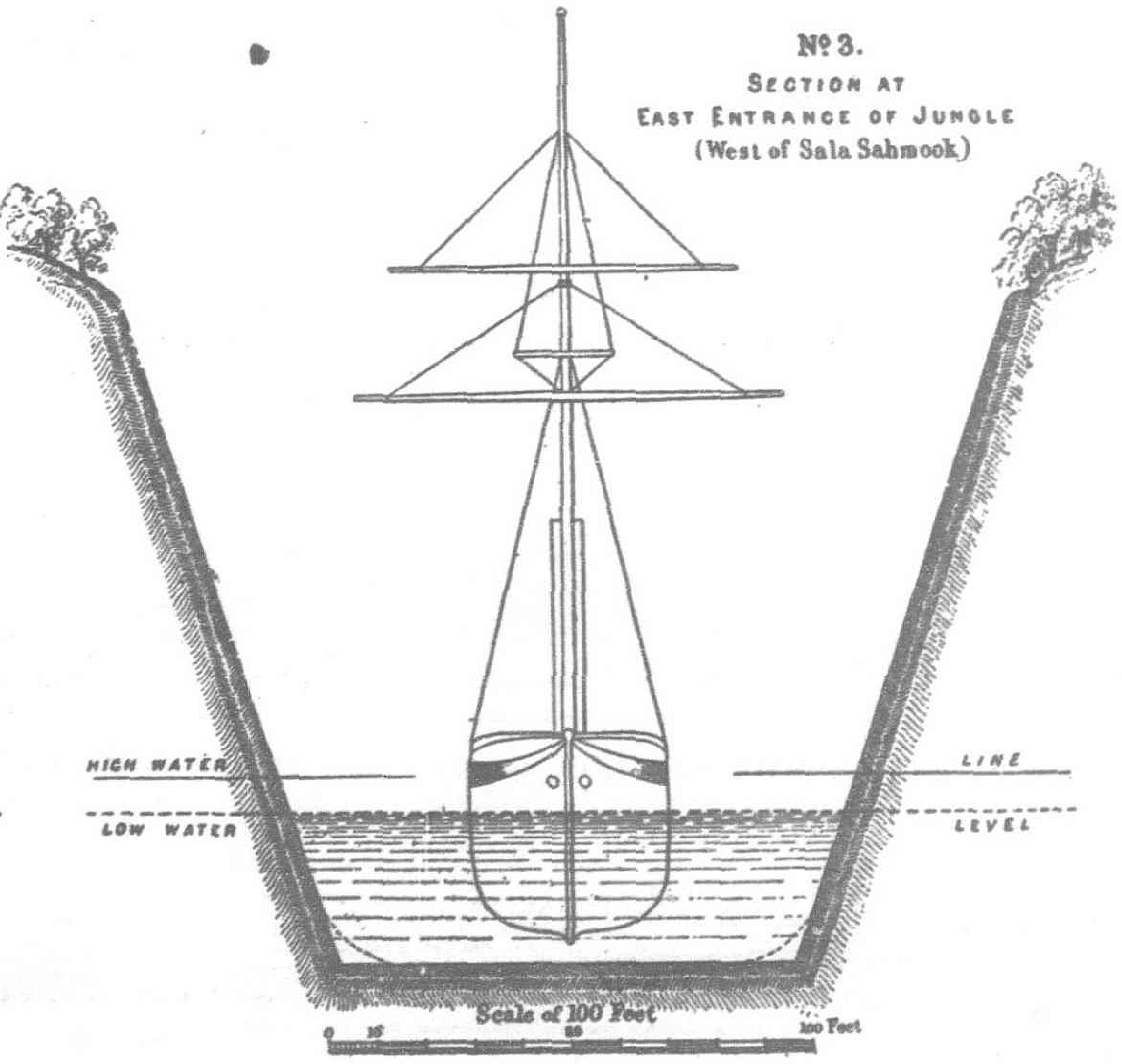
NOTE *The mean height of the levels by Aneroid, of the Mountainous District on the Krā Route, is 130 feet above Low Water Level, and 160 feet from the Bed of the supposed Canal excavations. The total length* of this portion of the Route is about 20 Statute Miles which is equal to (approximately) 83,854,222 Cubic Yards. When and where could this enormous bulk of Rock and Soil be removed and deposited?*

SKETCH SHOWS RELATIVE SIZE OF MAIL STEAMER (BEAM 40 FT. DRAUGHT 25 FT.) AND APPROXIMATE SECTION. AREA OF SECTION 5999 SQUARE YARDS.



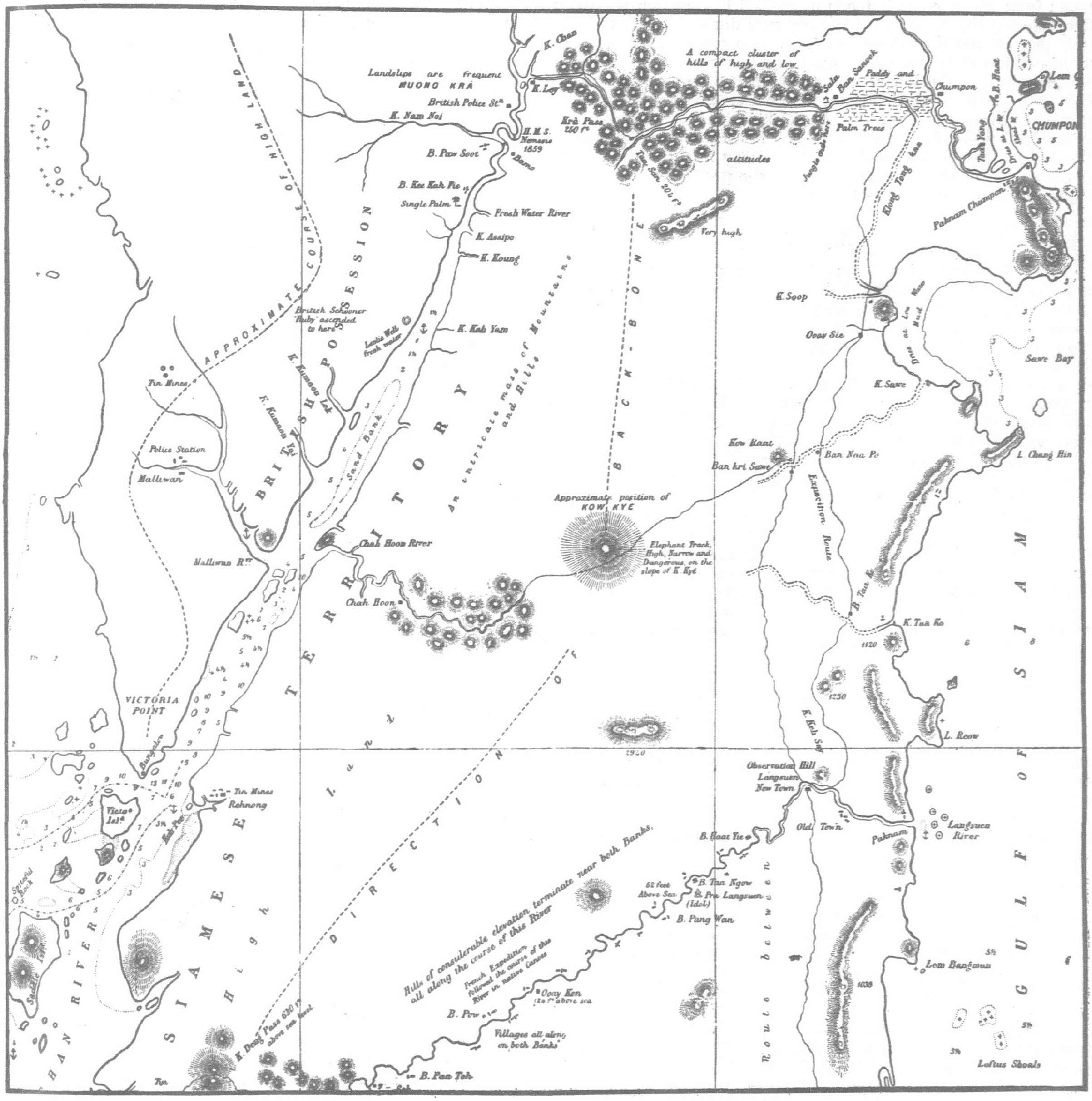
No 2.
SECTION AT KRĀ.
Landing Place.

MAIL STEAMER, BEAM 40 FT. DRAUGHT 25 FT. _ BREADTH OF CANAL 120 FT.
Klong Kali, Rocky bed. Dries at Low Water Springs.
Depth of supposed Canal 30 feet below Bed of Klong.



No 3.
SECTION AT
EAST ENTRANCE OF JUNGLE
(West of Sala Sahmook)

NOTE. *These three Sections cross Mountain Land, 75 or 80 per cent of which is hard Rock, and the balance, soil.*



A survey made years ago of the Kra Isthmus

across the isthmus of Kra. His notes on that journey were published in Singapore and London the same year, together with an explanatory map and sections and a lengthy reprint of the report on the same subject made to the Indian Government by Captains Fraser and Forlong in 1863. The French expedition was sent to survey the isthmus of Kra in order to ascertain the practicability of constructing a maritime canal to connect the Bay of Bengal with the Gulf of Siam. They landed at Chumporn on the east side, and left Renong on the west side for France.

Commander Loftus was not told what conclusion the French engineers came to on the subject, but since then France has not worried about that canal. Those who write sensational articles can to-day in their imagination see Japanese hiding in the grass and fiercely digging and blasting that canal. But after careful investigation Commander Loftus was of opinion that the proposed canal is quite impracticable. The two Bengal engineers mentioned above also told the Indian Government that a canal was impracticable, but they recommended a railway. The French expedition of six experts certainly made a most careful and detailed survey. The party first went south from Chumporn to make a preliminary survey of the Sawe and Langsuen rivers. They went up the latter river as far as boats could go, and then by elephants to Renong. Next going up the Pakchan river, they explored the Chah Hoon river but the gigantic hills convinced them that they could not get through. So they returned to the mouth of the Chah Hoon river, and went up the Pakchan to Kra. A lengthy and careful survey followed from Kra to Chumporn.

The Kra Route passes through a perfect conglomeration of hills of irregular altitude, and is not only exceedingly serpentine and undulating in itself, but makes a deep southerly bend at the pass; from which point it tends in an E.N.E. direction for about five miles as the crow flies. It then runs due east to end of the hilly district and the beginning of the open country. It must be understood that the elephant track on this route does not pass over the tops of the hills, but through the valleys between them. It is therefore obvious, if a canal were excavated in this direction, it would have a very objectionable kink in it, and a greater bulk of material would have to be removed if the route were aligned. The top of the pass is two hundred and fifty feet above the level of the sea. The ground through which the projected canal would require to be cut is chiefly of hard rock.

A Big Job

"The highest level of the pass is, as I have stated, two hundred and fifty feet above the level of the sea. The mean level, however, of the hilly district, which is twenty miles in length, is 130 feet. Increase this by thirty feet for the depth of the canal and we have one hundred and sixty feet. Now, assuming a transverse section, 191 feet at top, 77 feet at bottom, and 160 feet high, with only an angle of 20° slope from the perpendicular, and we shall have in round numbers eighty-four millions of cubic yards of mountain land, 75 or 80 per cent of which is hard stone! When could such an enormous bulk of material be cut through, and where could it be deposited? Certainly not on either side of the excavation. A portion might be deposited at the Kra end, but the greater bulk of it would have to be run out into the paddy land to the eastward. Considering that the dimensions of the section I have given are probably smaller than would be adopted if such an ill advised scheme were attempted, it appears to me from this, and from what I have seen, that there is as much chance of its ever being accomplished as there is of reaching the moon in four days." In a foot note Commander Loftus adds that the exact quantity to be removed would be 83,854,222 cubic yards, and that works out at 22,642,190 tons, about 80 per cent being hard stone.

Further Details

In conclusion we give points from the letter which Commander Loftus wrote to the Officer in charge of the French expedition, when they were on the point of parting :—"The jungle track from Kra to Chumporn is the best, and is of lower elevation than any of the others, but at the same time it possesses the same characteristics, in outline and natural features, as those in other parts of the Malay Peninsula, viz :—it is exceedingly tortuous and uneven. My own observations prove this, and doubtless the engineers' plans will confirm it. No direct line or anything approaching to one exists amongst the innumerable and intricate cluster of hills through which the Kra Route wends its course, and although the elevation is but 250 feet, and probably the bed of the adjacent Klong thirty or forty feet lower, it presents such a gigantic mass of stone cutting, extending as it does two-thirds of the distance across the Peninsula, that it would require the wealth of a nation and a century to accomplish.

"Supposing a canal could be cut from Kra to Chumporn, it would avail nothing, as the *upper half* of the Pakchan river is both serpentine and narrow and blocked up with sand banks, and is suitable only for the navigation of steam launches and trading boats; even these frequently get aground in passing up and down. Again, supposing all obstacles could be overcome to this point, and the entrance of the canal could be situated at some navigable position north of Melliwan, even then the scheme would be as insurmountable as before, for the intricate of lofty mountain chains in this neighborhood would preclude all possibility of making a *direct* or *indirect* cut obliquely from any part of the left bank of the Pakchan river to any point on the jungle track east of Kra Pass. I think one glance of the country about here would convince the most sanguine of the impossibility of such an undertaking.

"Now for the last point and not the least in importance.—We must again suppose the canal and Pakchan river practicable. There is still remaining another item of considerable difficulty to get over, viz :—the intricate channels at the entrance of the Pakchan. These are two—one north and the other south of Victoria Island. The former channel is narrow and tortuous, studded with sunken rocks and shifting sand banks. The south channel is better in this respect, and unquestionably the best of the two. The south passage is between two rocky points, half a mile wide, with sand banks on the larboard hand in entering, and a bar of sand and mud on the east side of Victoria Island with depths of two and a half and two and a three quarter fathoms upon it. This channel is open and exposed to the full force of the Southwest monsoon, and although it might, if lighted and marked properly, be considered fairly safe for small sized steamers, it is unquestionably the reverse for vessels of large tonnage." Commander Loftus's "Notes" were dedicated to the Royal Geographical Society of England.

The Older Scheme

Captain A. Fraser and Captain J. G. Forlong, of the Bengal Engineers, early in 1863 travelled by boat up the Pakchan river to Kra, and thence across the Isthmus of Kra to the Gulf of Siam at Chumporn. They did not seriously consider the canal project, regarding it as impossible, but with regard to the railway suggestion they wrote :—"It seemed from our survey of the route, so manifest that communication might be established with little comparative expense across this narrow neck of land, thus connecting the Bay of Bengal with the China sea by a route which would avoid *the long, dangerous, and circuitous passage by the Straits of Malacca,* that we thought it worth while to enter into a few calculations by which might be shown in figures the comparative advantages of the two routes. The following is the result, one which to our minds, makes a further examination of the Isthmus of Kra worthy of immediate consideration by our government in communication with that of Siam as likely to prove of advantage to each, and of enormous value to commerce and the travelling world in general. It would relieve the commercial world to a great extent of the enormous steamer charges which keep up the prices of the goods which form the staples of trade between England, India and China, and which render travelling almost prohibited, and it would open up a new and interesting country to the geologist and botanist, and introduce a hardy and hard-working population (the Chinese) into provinces which contain mineral wealth in known and unknown quantities, wealth which merely requires labor to develop to any extent, and in search of which the Chinese even now find their weary way, but who would then come in large numbers, especially as the new treaty allows them to emigrate with their families. . . .

[We have put the above eleven words into italics, as showing a curious old view of the Singapore route.]

"We will double what, in our own somewhat experienced minds, would be the cost of such a railroad across the Isthmus, and put down the amount at £5,000 per mile, including stations, and rolling stock for fifty miles of rail, £250,000. For the river service, three tug steamers, with all the advantages of disconnecting engines, towing with a single hawser, etc., which the Thames tugs possess, at £15,000

each, equal to	£45,000
Twelve coal barges at £800	£9,600
Cost of railway, rolling stock, etc., fifty miles	£250,000
Contingencies at 10 per cent, including buoying river	£27,000
	£331,600

or say half of a million sterling. But there is the interest on a capital of one million of money, saved every year in fuel, and establishment of running steamers only: surely it must be worth while the expending such a capital in establishing this communication.

"We therefore think that, without reference to the dangerous navigation the Straits lines should be abandoned as a communication between India and Europe, and China, as the old Cape of Good Hope line was abandoned for the Suez line. We have thus labored to prove, and we think have done so satisfactorily, that, as a mere speculation, the construction of a railway across the Isthmus of Kra will be profitable; that the communication may be established for a third of the capital, the interest of which is now being expended yearly on mere fuel and establishment of running steamers, and that a vast amount of time will be saved over present routes."

The Philippines—Its Richness in Gold

(From The Mining Journal)

A REVIEW of the mining industry of the Philippine Islands for the year of 1937 falls into three divisions, the mineral production, which was greater than ever before in both gold and base metal industries ; the mining share market, which suffered a complete collapse during the period ; and thirdly the shadow of governmental interference, which is becoming more and more apparent. The smooth course of mine operations was, of course, hardly affected by the stock market slump, although it is becoming increasingly difficult to raise funds through public subscription for even the most promising mining projects. The status of the Commonwealth Government is extremely unsettled. President Quezon, early in the year, demanded immediate (1938-1939) independence instead of waiting until 1946 as provided by the Tydings-McDuffie Law. Within the past few months, however, under the stimulus of the Sino-Japanese hostilities raging in China, he has apparently recanted, and now talks of a modification of the present arrangement so that the Philippines can become a Dominion. In the United States the feeling seems to be that the Philippines asked for their freedom—let them have it in 1946 and good riddance ! So far the attitude of President Quezon and the government has been far from favorable to the mining industry, and mining men fear that if and when full independence is finally granted, the Filipinos will nationalize the industry to the extent that the operators will not be able to carry on in their development of the new nation's mineral resources.

Mineral Production

GOLD.—Mining in the Philippines is predominantly gold mining, as has always been the case. The output for 1937 was around P.51,600,000 from some 2,751,880 tons treated, a gain of more than 15 per cent over the 1936 total and of nearly 60 per cent over the 1935 output. While there were two new plants erected and brought into production during the year, the increased output came chiefly from larger capacities at the older plants.

As has been the case for some years, the Benguet interests accounted for nearly half of the entire gold extracted in 1937. The largest producer in the Islands, Balatoc, treated 445,000 tons of ore from which around P.13,000,000 was extracted. The second largest producer, Benguet Consolidated shipped bullion valued at around P.10,000,000 tons of ore. Cal Horr and Ipo Gold accounted for around P.1,850,000 between them.

The three plants of the Soriano group were second to Benguet in value of gold shipped. Antamok Goldfields, the Islands' fourth largest producer, handled 250,000 tons of ore from which around P.5,500,000 was extracted. Masbate Consolidated, with the largest milling plant in the Far East (2,000 tons daily) treated around 610,000 tons of ore for a recovery of some P.3,000,000. I.X.L. extracted P.2,250,000 from 89,000 tons of ore. A detailed description of the operations of this group appears elsewhere in this issue.

Activities of the Marsman associates (about which more on another page) resulted in the extraction of nearly P.9,000,000 in gold. Itogon, third highest gold producer, contributed P.3,400,000 of this from 252,000 tons of ore handled.

San Mauricio and United Paracale, in Camarines Norte, each produced around P.2,000,000 in 1937, from 67,000 and 105,100 tons treated respectively. Suyoc Consolidated added P.1,500,000 to the total, from 75,500 tons of ore.

Most of the independent companies reported substantial increases over the figures of 1936. Demonstration Gold Mines' output was around P.1,160,000 from 93,000 tons of ore treated. East Mindanao handled 38,800 tons of ore from which about P.660,000 in gold was extracted. Baguio Gold had an output of some P.1,275,000 from 74,000 tons handled. The Big Wedge production was nearly P.1,350,000 from 42,000 tons of ore. Mindanao Mother Lode, which started operations in September, accounted for some P.825,000. Benguet Exploration continued to operate its leaching plant and treated 37,700 tons of ore for a recovery of P.265,000. Royal Paracale (formerly I.X.L.-Argos) produced P.320,000. Twin Rivers started a tailings plant in August and in the 5-month period had handled 100,000 tons and recovered P.175,000. Two small placer operations, Tambis and North Mindanao added P.285,000 to the total. One plant, that of the Salacot Mining Co., was forced to suspend operations at the first of November because of the depletion of ore reserves ; it produced P.281,000 for the 10 months, from 50,500 tons of ore.

BASE METALS.—Base metal production made a remarkable advance, although the total value of the mineral exports was negligible in comparison to those of the gold mines. The Philippine Iron Mines 1937 production was some 600,000 tons valued at P.2,300,000, all of which was shipped to Japan. Lepanto Consolidated, which started its copper concentration plant in Mankayan in October, has shipped concentrates valued at P.51,675. Mineral Resources, with a lead-zinc plant in Marinduque, has some P.50,000 in concentrates to its credit. Mine Factors, mining manganese and copper ores in various parts of the Islands, has sent ore abroad valued at around P.175,000. Amalgamated Minerals, company formed by English ore-buyers for the export of copper, manganese, and chromite ores, has sent 20,000 tons to foreign markets, valued at some P.500,000.

Base metal exports for the first 10 months of 1937 (latest figures available), as reported by the Bureau of Commerce, follow :

	1936		*1937*	
	Kilos	*Value*	*Kilos*	*Value*
Iron Ore ..	502,136	P.2,214,765	533,030,764	P.2,351,778
Chromite ..	8,035,884	214,920	44,106,202	836,740
Copper ..	6,054	1,704	13,177,652	501,771
Manganese ..	254,000	6,000	9,025,054	195,176

During the year a smelter was installed at Mambulao for the principal purpose of treating flotation concentrates from San Mauricio and United Paracale, although it is planned to accept ores and concentrates from other companies. The capacity of this smelter has been increased from 50 to 75 tons a day, and a considerable saving is being effected by both companies in transportation charges. Products of the smelter are a copper matte and free gold.

Mining Share Market

The collapse of the mining share market of the Philippines has been as rapid as was its spectacular rise in 1936. It has been unfortunate that while the legitimate mining industry has made steady strides in every way, the prices of mining stocks have declined so that the end of 1937 found even producing mines quoted at less than one-third of the previous year's levels, and in some cases one-seventh of the boom levels of October, 1936. Public confidence in the mining stock market has been severely shaken, and, unfortunately, this lack of confidence has too often been extended to the industry itself.

The boom started early in 1936, and reached a peak during the last week of October of that year, when the gold share average, as measured by a leading brokerage firm, reached a record of 256.3. New high prices were recorded by most of the issues in October, and the daily turnover often amounted to five or ten million shares, valued at from one to two million pesos.

Early in November, 1936, President Quezon signed the new mining law (which will be discussed at more length later in this review). Within three days from the date of his signing the bill the market value of listed mining stocks in Manila depreciated around £200,000,000. It has not since recovered, nor does it seem likely to until the law is clarified and until the political and economic situation in general shows a considerable improvement.

Mining executives and business men rallied to the support of the market, and a sharp upturn occurred November 12, 1936. The downward movement started early in 1937, has continued with but few upward breaks. The gold share average on the last day of each month of 1937 reflects this trend. January, 221.73 ; February, 196.75 ; March, 163.44 ; April, 146.16 ; May, 146.58 ; June, 134.81 ; July, 95.62 ; August, 83.01 ; September, 84.37 ; October, 81.36 ; November, 74.26 ; December, 65.44.

The entire blame for the stock depression cannot be placed on the government. Continued rumors of a drop in the price of gold ; talk of immediate independence for the Islands ; the outbreak of hostilities between Japan and China ; the Spanish civil war ; and unsettled conditions in general all added to the general uncertainty.

A most important factor, of course, was that the boom of 1936 saw the floating of hundreds of mining companies, most of which were promotional in character. Many of such companies raised large sums of money which was promptly spent in commissions, promotion fees, purchase of worthless claims, and otherwise wasted. The stocks' prices of all mining companies, legitimate or otherwise, soared to reckless heights, many times the value even the most optimistic would dare give them. Thousands of small investors bought mining shares at exhorbitant prices, and are still holding them. Millions of pesos are tied up in companies which have no possible chance of success. At least three of the Manila banks hold considerable shares of mining stocks as security for loans made by brokers and speculators, at boom-time prices. A gambling craze swept the country, and it is but little wonder that there has been an equal and opposite reaction.

On September 10 the two surviving stock exchanges (the newest exchange died after a brief life) pegged prices as of that date. There has been but little trading since that time, and practically every stock is now at the pegged level with no bids apparent. During the last few days of the year, it is true, business picked up appreciably ; practically all of this trading was cross selling for income tax purposes. Liquidation, enforced and voluntary, on the part of large and small stockholders alike, has brought the mining share market to its lowest level since early in 1936.

This situation has not affected the operating mining companies materially. It has hindered the activities of a few promising companies which have been unable to raise money to construct milling plants or to finance the further development of promising properties. The first of the year, however, with new sugar money coming into circulation is expected to remedy this state of affairs somewhat. Most financiers realize that the mining industry and the stock market are separate entities, and that the one should not be blamed for the failings of the other.

The Government and Mining

Although but little of a concrete nature has been done by the Filipino Government to injure the industry, the mining operators are pessimistic as to what may be done in the future. It is certain that President Quezon and his associates are not eager to kill the goose that is laying so many golden eggs, but it is equally certain that there is grave danger that the legislators may injure the industry through a misunderstanding of its problems.

The attitude of the government so far has been anything but sympathetic. As might be expected of a new nation, a strong spirit of nationalism prevails. The Filipinos, naturally enough, want their country entirely to themselves. The main point at issue is whether or not the new government will respect the rights of Americans and foreigners as guaranteed by the constitution under which the Commonwealth was created.

Some 110,000 claims were located in the Islands prior to November 15, 1935 (the date of the inauguration of the Commonwealth). Of these but 149 were patented. The new mining law takes away the rights of holders of all of the rest, although the constitution clearly states that rights granted by the government under the U.S. regime must be respected. All mining claims, except the few under patent, must be operated under a leading system under the new law. This system provides for governmental supervision which practically amounts to management ; imposes a royalty on gross output which is fair enough now, but which may be increased at the will of the Assembly. The leaders of the industry maintain that a tax on gross output is obviously unfair, since costs of operation and extraction per ton are bound to vary. Thus, two companies each producing a million pesos worth of gold a year are taxed the same amount, although one may make a profit of P.200,000 while the other may operate at an equal loss.

The joker in the mining lease provision is that no mineral can be extracted for commercial purposes until a lease has been granted. This will go into effect next November, and by it all operating companies except those which have patents must suspend operations until leases are granted. If leases are granted promptly, well and good, but mining men fear governmental red tape and deliberate slowing up of official legal machinery. Thus a company after spending thousands in bringing a property to the producing stage might be forced to wait until the government got around to granting a lease before it could recover a peso—and the Filipino government so far has been notoriously slow in granting anything to Americans or foreigners.

Prospects for 1938

In spite of the crippled condition of the mining share market and of the fear of governmental interference, prospects for the mining industry of the Philippines for 1938 are excellent. Gold production should reach the P.60,000,000 mark. Base metal ores will be shipped in increasingly large quantities. As many as 10 new milling plants are under consideration, and at least half of this number will more than likely be built by the middle of the year.

Two new dredges are now going into operation in Paracale Bay, for Coco Grove Inc., a Marsman subsidiary. These dredges replace the three harbor dredges which operated for a while in 1936, but which were found to be unsuitable for gold mining work. Delivery was planned by the middle of 1937, but labor and shipping strikes in the United States so delayed them that it was not until September and October that the hulls could be launched in Manila. This project should account for some P.300,000 a month when in full operation.

Expansion and construction programs were completed during 1937 by many of the larger plants, notably Benguet Consolidated, Itogon, Masbate Consolidated, and Consolidated Mines. The costs of such projects naturally detracted from 1937 profits, while the full benefits are just now being reaped.

Consolidated Mines has completed test work on its huge chromite deposit in Zambales (10,000,000 tons of low grade ore), and it is hoped that production, started on a small scale by the operator, Benguet Consolidated, can be greatly expanded this year.

A new iron producer, the Samar Mining Co., will start shipping ore to Japan early in 1938 at the rate of 18,000 tons a month. Several small producers of manganese, copper, chromite, lead and zinc, may be expected.

The Sino-Japanese difficulties have caused a considerable increase in freight rates, and thus to mining costs. Mining supplies in general have risen substantially, and this, of course, has not added to the profits of the mining companies.

On the other hand, there has been increased demand for base metals from Japan, and this demand is apt to continue for some time. Japan is the logical market for all Philippine mineral products ; already most of the ore of the Islands goes to Japanese smelters (chromite shipped by Benguet from its Florannie and Consolidated Mines operations, however, goes to the United States).

If the government will be reasonable in its demands on the industry, and if it will co-operate with the operators, the mining industry of the Philippines will enjoy the most prosperous year of its existence in 1938.

Dividends paid by Philippine gold mining companies for the past two years have been as follows :—Antomok Gold Fields (1936), P.2,062,500 ; (1937) P.2,200,000. Atok Gold (1936) *nil ;* (1937) P.100,000. Baguio Gold (1936) P.129,890 ; (1937) P.194,835. Balatoc (1936) P.5,600,000 ; (1937) P.6,000,000. Benguet Consolidated (1936) P.8,000,000 ; (1937) P.6,000,000. Benguet Exploration (1936) P.50,000 ; (1937) *nil.* Demonstration (1936) P.200,000 ; (1937) P.400,000. Gold Creek (1936) P.105,000 ; (1937) *nil.* Ipo Gold (1936) P.116,475 ; (1937) P.116,475. Itogon (1936) P.597,168 ; (1937) P.300,000. I.X.L. (1936) P.200,000 ; (1937) P.187,500. San Mauricio (1936) P.320,000 ; (1937) *nil.* Suyoc Consolidated (1936) *nil.* ; (1937) P.125,000. United Paracale (1936) P.275,000 ; (1937) *nil.* Totals (1936), P.17,656,033 ; (1937) P.15,623,810.

In addition to the above cash dividends, stock dividends were issued as follows during the year :—Antamok Goldfields, 100 per cent, from P.1,375,000 to P.2,750,000 in January ; Balatoc 100 per cent, from P.4,000,000 to P.6,000,000, October ; I.X.L. 50 per cent, from P.1,000,000 to P.1,500,000. April ; Ipo Gold, three per cent, from P.776,500 to P.799,793, October, 1937.

Management and Investment companies have paid dividends during 1937 as follows :—Mines Factors, P.83,640 ; Developments Inc., P.25,000 ; Marsman and Company, P.235,075 ; Marsman Investments, P.1,000,000 ; Philippine Iron Mines, P.400,000 on

(Continued on page 200)

Can Dredging be of Use in the Regulation and Maintenance of North China Rivers?

By S. ELIASSEN

(From the Journal of the Association of Chinese and American Engineers)

THE silty rivers of North China present problems in regulation and maintenance more formidable than those of most other rivers in the world. People not acquainted with them generally suggest dredging as the sole cure for their ills. As soon as one of the frequent flood disasters occurs we read in the newspapers that these rivers should be dredged to clear away the silt which constantly accumulates in their beds making their diked courses higher than the plain which they traverse.

On the face of it dredging seems so logical and so simple a remedy, especially when we read about the astounding performances in dredging outputs of modern suction dredges, some of which equal the work of 15,000 to 20,000 men. They dig under water as men cannot. Those, however, who are better acquainted with the North China rivers are more cautious in their recommendations. They know that the prospects of success are not as rosy as it may seem at first thought.

Most of the rivers have very little flow and are very shallow during the time when dredging operations should be carried out. This at once puts a limit to the size and capacity of dredges which can be operated. Even on the Yellow River, which is by far the largest of the North China rivers, it is questionable whether it will be feasible to use dredges with an hourly capacity larger than 300 to 400 cu.m. which is only about one-fifth of the capacity of some of the great, modern dredges used on rivers in America, for instance. On other notable rivers of North China, such as the Yung Ting Ho, the Tzu Ya Ho, the Nan Yun Ho and the Pei Yun Ho the largest, usable capacity will probably not exceed 100 cu.m. per hour and even these small dredges will be lying idle for the best part of the spring because there will not be water enough to float them. On the tidal Hai Ho, from Tientsin to the sea, medium-sized dredges are, however, used, the largest of which may excavate silt at a rate of 500 cu.m. per hour. But at times the silt which is carried into the Hai Ho from the upstream tributaries is so heavy that the combined Hai Ho dredging fleet is powerless to excavate the silt as fast as it is deposited in the riverbed. Due to the flat slope of the Hai Ho and the fact that there is a slack water period twice a day during the reversal of tides, the silt has ample opportunity for settling in the bed. Under particularly unfavorable conditions the silt settles in its upper reaches at a rate exceeding 50,000 cu.m. per hour, or 100 times faster than one of the largest Hai Ho dredges can excavate. Even if a dredging fleet were available to cope with the situation the problem of disposing of the excavated silt remains. Also, the dredges with all the necessary barges and tow boats would be such a large number of vessels that they would obstruct the traffic. From the viewpoint of practicability and economics it would be a prohibitive task. Hence other measures are now being used to maintain the navigable depth of this river, such as diverting some of its most silt-laden tributaries onto large settling areas on the plain, at periods, when they are in highly silty freshets.

Hai Ho is Special Problem

The Hai Ho, however, presents a special problem. But the fact that dredging on this river is only a partial success has lead engineers to be sceptical, generally, regarding its use on very silty rivers. On the tributaries to the Hai Ho we have also seen that, due to the low spring flow and shallow conditions, the use of dredges may not produce much result. But what about the Yellow River? This river, when regulated, may permit the navigation of vessels drawing three feet, that is where it traverses the plain from the Peiping-Hankow Railway to the sea. Would dredging help to increase further this depth and also lessen the flood disasters occurring so frequently? A discussion of this question may have some value.

The rôle of dredges in river conservancy work is generally confined to deepening a river in the interests of navigation. Rarely is it used as a flood-preventive measure. The large fleet of the Mississippi River Commission is operated almost solely in the interests of navigation. It has of late been used for cutting off a number of bends in order to straighten the highly sinuous course of the Mississippi and thus improve its flood-discharge capacity. But actually to deepen the river course itself so that it will be capable of discharging more floodwater has, I believe, never been considered. And perhaps rightly so. When the Mississippi begins to rise, on the advent of a flood, the riverbed also tends to rise in all crossings between bends due to silt deposition. To try to deepen the river when its own action is one of deposition would naturally not be very favorable to success since the rate of deposition most likely would far surpass the rate at which a dredge or several dredges could excavate. But when the flood crest has passed the deposits begin gradually to be washed away. This is often somewhat slow, however, and the fall in water level may be more rapid in comparison so that there will be difficulty for ships to navigate, and this is just the time when dredging is most necessary. But the condition is then favorable to success as the river's own scour action assists the dredging operations. Since the flood danger has passed no thought is given to any benefit the dredging may have as regards flood prevention. During the low-water season the Mississippi is generally good for navigation and little dredging is necessary.

On the Yellow River the condition is different. This river is shallow and difficult to navigate during the low-water season; but as soon as the floods arrive it begins to scour its bed and a relatively deep channel exists throughout the high-water period. It is this characteristic which has led me to believe that it may be possible by means of dredging to encourage the Yellow River both to increase its ability to transport silt and to improve on its scour action. The objection may be raised that the Yellow River carries so much silt during the flood season that even many dredges may not be able to show much result, at least not commensurate with the cost of dredging operations. Also, to use dredges solely for the purpose of improving the navigable depth will be exceedingly costly and not worth while as the traffic the river carries is not large enough to warrant such heavy expenditure. From a close study of the river I believe, however, that dredging operations should be experimented with in order to find out to what extent the river will respond to such treatment.

The Yellow River, in common with other rivers of North China, raises its bed steadily, but slowly. It amounts to an average of about three to four feet per century. Its yearly silt load entering the upper end of its diked course through the plain is perhaps not less than 900 million cubic meters on the average, and the silt outflow into the sea about 700 million cubic meters yearly.* Thus about 200 million cubic meters of silt is annually left behind along the diked course of which five-sixths will be deposited on the river's wide foreshores between the dikes and the channel, while one-sixth will be deposited in the actual channel. It is this quantity of about 33,000,000 cubic meters of silt with which we are mainly concerned. To excavate it every year by means of dredges will be a stupendous task since a single dredge cannot cope with much more than 600,000 cu.m. per year and to do so will mean a dredging fleet of more than 60 dredges with numerous tow boats, barges, pipe lines, dry docks, work shops and other auxiliary equipment, a most expensive and cumbersome plant to operate and maintain in condition. More than 10 million dollars per year would be required in operating expenses and it would be a continuous process. The dredging plant would cost over 50 million dollars. Any government would think twice before sanctioning such expenditures.

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* Assuming no dikebreaches

Aid in Transport of Silt

A more practicable plan would be to improve first on the river's ability to transport its silt by regulating the channel, giving it a more uniform width, better fitted to the flow than at present and also giving the bends a smoother curvature. This would create a more efficient hydraulic condition and thus increase the velocities which again would mean a better silt-carrying capacity. In this regulation dredges would be utilized. Due to the irregular flow of the Yellow River, more than 20,000 cu.m. per sec. during floods and less than 200 cu.m. per sec. during low-water periods, the regulated channel would still be rather wide, too wide to prevent sand bars forming in most of the crossings between bends, and it is in these crossings that one must expect the river to scour the least when there is a flood passing down the channel, and also shoal the most during low-water stages. Dredged trenches through these shoals would promote silt transportation during low-water periods. Assisted by lightly constructed, removable contraction works a more hydraulically efficient channel could be maintained through such crossings. When the floods arrive they would wash out the deposits more easily since there would already exist an initial channel having better scour velocities than would be the case otherwise.

Downstream from the Grand Canal crossing the present width of the Yellow River is practically what it would be under a regulated condition. But the sinuosity of the channel is far too excessive. Here it would be feasible to experiment with a few dredges by selecting a stretch, say 50 km. in length, smooth out the bends and then carry out dredging with the idea of promoting silt transportation and encouraging the river to scour deeper during floods than it does under present conditions. Close observation as regards results and comparison with the river's action in the reaches immediately upstream and downstream from the experimental reach must, of course, be made, in order to reach reliable conclusions.

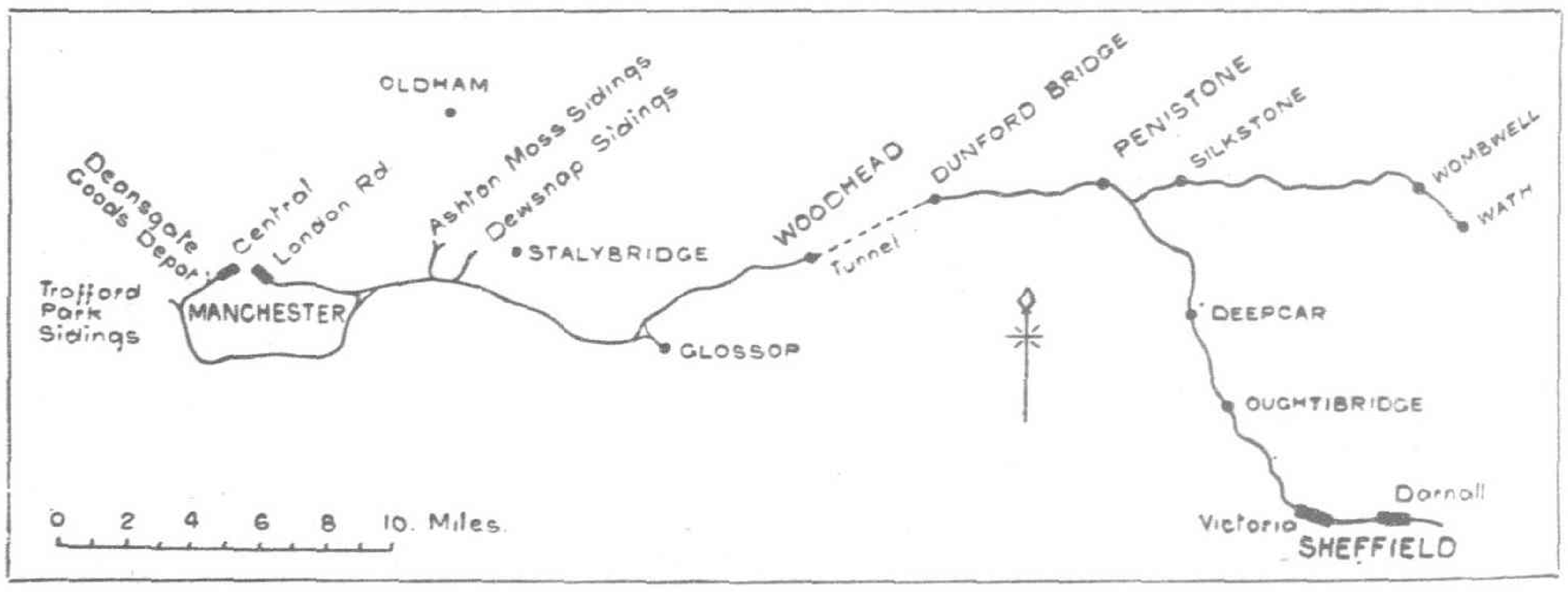
As regards the beneficial effect such dredging operations may have on the navigable depth it may be said that as long as the native sailing boat is the sole means for transportation the increased depths will be only of partial value since the dredged channels will be narrow and the times infrequent when the wind direction is such that the boats can sail straight through them. But when the Yellow River has been put under better control and there is more security against dike breaches it is likely that the river will be used to a far greater extent for transportation than at present. Then engine-propelled crafts may become the rule instead of the exception. When this takes place more attention may be given to navigation improvements. For the time being every effort should be concentrated on the aim of conveying the floods and the silt through the diked channel in the safest manner. If I am not greatly mistaken dredges will play an important rôle in this respect. A silty river is highly sensitive to changes in its regimen and it may well be that dredging, judiciously done, will improve the silt transportation and scour action sufficiently to slow up to a marked degree the river's present tendency to raise its bed and, during floods, to lower the water levels and thus pass the flow to the sea more safely.

Dredges to Encourage Flow

The influence of the Yellow River delta on the course upstream may need some comment. A peculiarity of the delta is that the river course through it is much steeper than in the section immediately upstream. Before the river reaches the head of the delta it has a slope less than 1 : 12,000. But from the middle of the delta to the sea the slope is 1 : 5,000. On most rivers as they approach the sea the slope becomes increasingly flatter. It has been observed that when the course through the delta is good the channel for a considerable distance upstream from the head of the delta is also in a deep and good condition. Since the delta and the sea immediately outside is the natural storage reservoir for most of the silt which the river carries, changes of course through

(Continued on page 201)

Metrovick Locomotive Equipment Supplied for Electrification Scheme



FULLER particulars are now available concerning the electrification scheme of the London and North Eastern Railway for the main line from Manchester to Sheffield and Wath, in connection with which announcements were recently made of important contracts placed with British Insulated Cables Ltd. for overhead line equipment to the value of about £1,000,000, and with the Metropolitan-Vickers Electrical Company for complete electrical equipments for seventy locomotives. The value of the latter contract is about £550,000.

The section covered by the electrification scheme is shown by the accompanying map. It embraces the main line between Manchester and Sheffield, together with the branch line to Wath-on-Dearne, a total of 75 route miles in all.

The electrification is to be on the overhead line system at 1,500-volts direct current, which is the higher voltage standard system recommended, especially for long distance main line electrification, in the 1927 report of the Railway Electrification Committee of the Ministry of Transport. This will be the first 1,500-volt D.C. main line electrification in this country.

The conditions of the traffic and the route across the Pennines render the section particularly suitable for electrification. The traffic is particularly dense, varying in character from express passenger trains with a trailing load of 250 tons to heavy mineral trains with a trailing load of 1,100 tons. The route includes long gradients, 22 miles averaging 1 in 147 on the Manchester side and 19 miles averaging 1 in 127 on the Sheffield side and also a severe section, rather more than two miles averaging 1 in 40, on the Wath branch. It also includes five tunnels, the longest being the well known Woodhead tunnel, really two separate tunnels, each three miles long, for the up and down lines. The absence of smoke in the tunnels, will not only improve conditions for both drivers and passengers but will actually allow a more frequent service and therefore increased tonnage through the tunnels.

The seventy locomotives at present arranged for, are for mixed traffic service. They will be of the four-axle double bogie type $(0-4+4-0)$. Their weight is estimated at 80 tons and their hourly rating will be approximately 1,850 h.p. The mechanical parts of the locomotives, comprising the underframe, bogies and superstructure, will be built by the Railway Company in its own works. It is anticipated that the mixed traffic locomotives will be able to handle all classes of traffic except the express passenger trains, for which a small number of electric locomotives of express type will be required. The contract for these has not yet been placed.

Though electric locomotives for 1,500-volt operation have not previously been in general use in this country, the Metropolitan-Vickers Company has had extensive experience in the construction of the necessary equipments for railways working at this and even higher voltages abroad. 41-1,500-volt freight locomotives and 23 high speed passenger locomotives supplied by this Company are in operation on the Great Indian Peninsula Railway and 120-3,000-volt mixed traffic locomotives on the South African State Railways, for which 42 more have recently been ordered, besides smaller numbers of locomotives for service in other parts of the world.

Russian Aluminium Industry

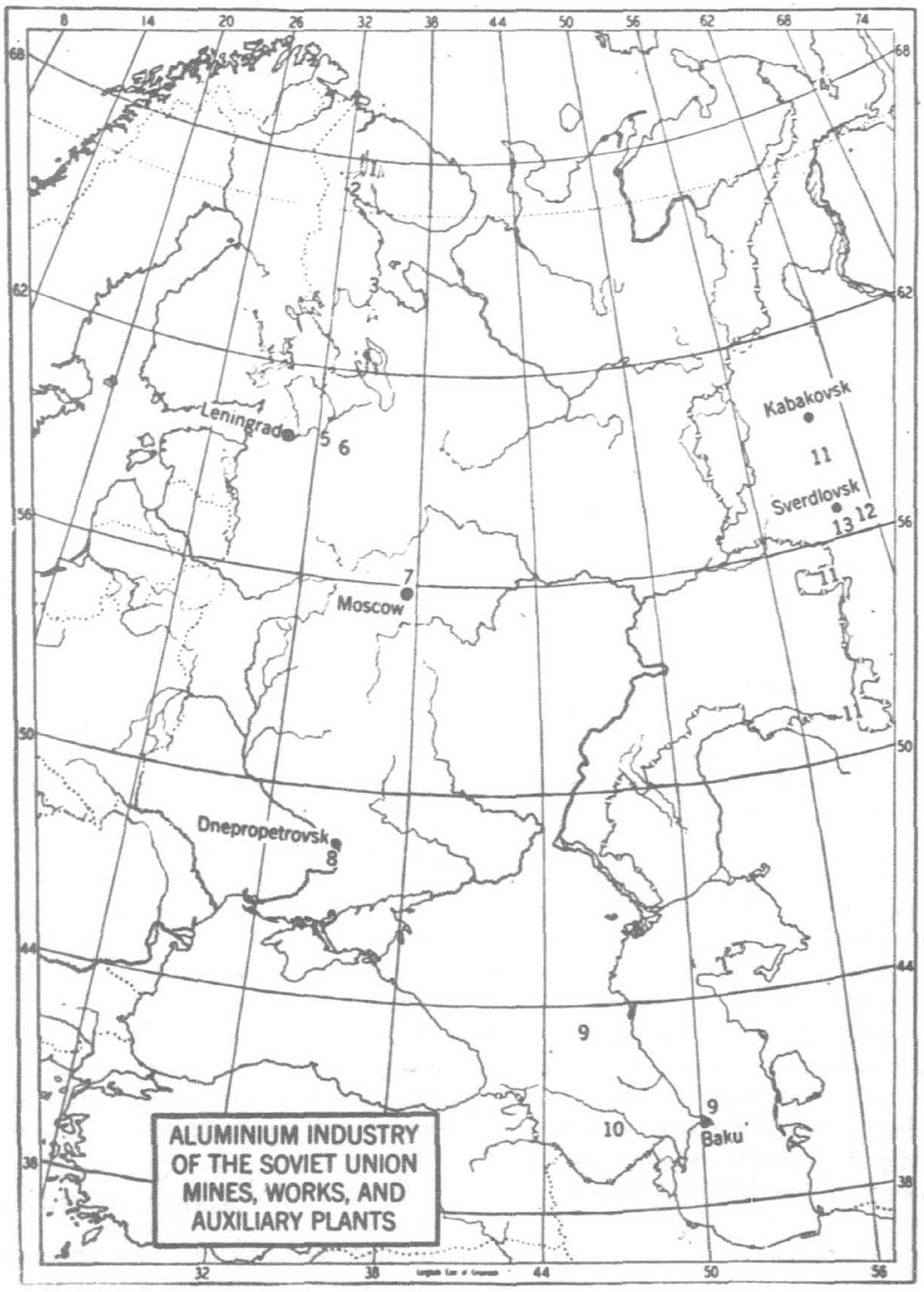
By ROBERT J. ANDERSON, D.SC., in "The Mining Magazine"

The following is a review of the factors that have helped in the rapid expansion of the aluminium industry of the Soviet Union and of its prospects, some notes on processes and production costs being included.

* * *

PRIMARY aluminium was produced on an industrial scale by the Soviet Union for the first time in 1932, the output in that year being about 900 metric tons. In 1936 it had grown to 37,900 tons and the Soviet Union ranked third among aluminium-producing countries of the world, following the United States and Germany. Bauxite mining has been developed rapidly in the Soviet Union during recent years, the output in 1931 being 11,600 metric tons and in 1936 about 200,000 tons. These achievements reflect the partial fulfilment of certain aims projected under the first and second Five-Year plans. The present intention of Soviet authorities is to increase greatly the output of aluminium. New works are in process of construction and the capacity of existing plants is being enlarged. Moreover, new bauxite mines have been opened lately and the output of ore is to be increased substantially. Developments of the last few years and current plans suggest that the Soviet Union may become the foremost producer of aluminium.

Much investigative work in the field of aluminium metallurgy had been done in Russia before the Revolution, but industrial production of the metal was never considered feasible. Bayer carried out experiments in the Tentelev chemical works at St. Petersburg and also elsewhere in Russia on his wet (alkaline) process for extracting alumina from bauxite, the Bayer process being patented in 1887. It subsequently became the standard method for making alumina to be used in aluminium reduction and is still employed by nearly all producers. In 1893 Penyakov patented his first dry process of treating bauxite to form alkali aluminate. He later devised and patented several related processes. Before the War Penyakov methods were applied in practice for making alumina at plants in Belgium and France. Work on the constitution of the aluminium reduction-cell bath was begun at St. Petersburg prior to 1912 by Fedotev and collaborators of the Polytechnic Institute, where they investigated the sodium fluoride-aluminium fluoride, cryolite-alumina, and other systems. The papers published on the results of these studies are classics in aluminium literature.


Leningrad
Moscow
Kabakovsk
Sverdlovsk
Dnepropetrovsk
Baku
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ALUMINIUM INDUSTRY OF THE SOVIET UNION MINES, WORKS, AND AUXILIARY PLANTS

Map showing Bauxite Deposits, Aluminium Works, and Auxiliary Plants in the Soviet Union

Key: (1) Khibini apatite-nepheline mine; (2) Kandalaksha alumina plant; (3) Sosnovetz aluminium works; (4) Amderma fluorspar mine; (5) Volkhov aluminium works (alumina plant); (6) Tikhvin bauxite mines (alumina plant); (7) Moscow electrode plant; (8) Dnieper aluminium works (alumina, carbon electrode, and cryolite plants); (9) Oil refineries (petroleum coke); (10) Gandzha cryolite plant (alunite deposits); (11) Ural bauxite deposits and mines; (12) Kamensk aluminium works (alumina and electrode plants); (13) Polevskoi cryolite plant.

Some aluminium products were made in Russia before the War, but the consumption of both pig metal and manufactures was relatively small, the requirements of the country in raw aluminium being supplied by imports. In 1913 the total imports were about 1,800 metric tons. Military needs greatly increased the demand for aluminium when the War started and imports rose in 1915 to about 6,300 tons—the largest quantity taken in any year before the Revolution. Proposals were made during the War (and also earlier) to produce primary aluminium in Russia from the bauxite of the deposits near Tikhvin, the occurrence of bauxite here having been reported in 1882. These deposits were known to be low grade and prospecting in 1916 indicated that the quantity was not large. No high-grade bauxite had been found in the country and cheap hydro-electric power had not been developed. All circumstances considered, the production of aluminium in Russia under the old regime appeared to be a poor risk for either home or foreign capital.

Using Domestic Materials

About ten years ago the Soviet Union decided to produce aluminium from domestic materials, despite all obstacles and adverse conditions. Plans, which have subsequently been revised from time to time, were then made for works to supply enough metal for the requirements of the country. As is known a fundamental aim of the Soviet Union is to shape its economy so as to attain maximum independence of foreign countries. Hence the endeavor is being made to furnish all possible products at home, thus obviating any unnecessary imports. A broad object is rapidly to transform the country into a modern industrial state and its many natural resources are being extensively developed in order to provide the various raw materials needed in producing numerous manufactures and useful goods. There has been special incentive to undertake the home production of aluminium because Soviet officials have continually feared war. In preparing for national defence they anticipated the need for large quantities of the metal to be used in the manufacture of aircraft, motors, and other armament. Furthermore it was seen that much aluminium would be required in making cable for the transmission of electricity from the many power schemes which were projected. In addition the organization of aluminium production and fabrication came properly within the scope of the first Five Year plan whereby the development of basic industries and of electric power was strongly emphasized.

Resolutions were passed as early as 1924 calling for the immediate creation of a Soviet aluminium industry. The problem was studied for several years and in 1927 a small experimental plant for metal production was being operated at Leningrad. In September, 1928, the Supreme Council of National Economy issued an order providing for preliminary work to be undertaken with the view to building an aluminium reduction works near the Dnieper hydro-electric power station, which was then under construction. The capacity of this plant was originally set at 10,000 tons of aluminium a year. In accordance with the initial provisions of the first Five-Year plan, as approved in May, 1929, the output at the proposed Dnieper works was to have been 5,000 tons in 1933. Within a few months, however, this program was revised. In August, 1929, the Council of Labor and Defence passed a resolution providing for another aluminium works to be built as soon as possible, the Council, at the same time, raising the intended output for 1933 from 5,000 to 20,000 tons. The site designated for this second works was near the Volkhov hydro-electric station, about 75 miles east of Leningrad, and its projected capacity was 6,000 tons a year. Actual construction of these two aluminium works was begun in 1930.

The second Five-Year plan called for a great increase in the output of motor-cars, lorries, tractors, electrical apparatus, aircraft, and military equipment, as well as for the erection of many long lines for the transmission of electricity. In a preliminary draft of the plan the total requirements of aluminium were estimated at upwards of 200,000 tons for 1935 and more than 500,000 tons for 1937. These ridiculous figures were later scaled down and in the final draft an output of about 85,000 tons was projected for 1937. In order to produce this quantity of metal the following program was planned: (1) Enlargement of the Volkov works to a capacity of 12,000 tons a year; (2) enlargement of the Dnieper works to a capacity of 38,000 tons; (3) construction of a new aluminium works at Kamensk in the Ural Province, with an initial capacity of 25,000 tons, and (4) construction of another new works in Karelia, with a capacity of 10,000 tons a year. The program also comprised building plants for producing the required alumina. Construction of the Kamensk works was started in 1933 and of the Karelia works in 1934.

The development and current position of the aluminium industry in the Soviet Union are discussed in the present paper. Some notes of interest on processes and production costs are included.

BAUXITE DEPOSITS.—Up to a few years ago the bauxite resources known in the Soviet Union were meagre and the occurrences that had been found were of poor quality. Only the low-grade deposits near Tikhvin, in the Leningrad district, were being mined as ore for aluminium reduction and this, until recently, was practically the sole source of bauxite in the country. A small deposit (the Zhurovlinsk), near Chosovaya station on the Gornozavodskaya railway, in the Sverdlovsk district, had been investigated in 1922. It was subsequently worked out. A comprehensive campaign of prospecting was undertaken in 1928 with the object of discovering additional sources and as a result numerous deposits of bauxite and related rocks have lately been found in various localities. Among the most important and fully explored are some occurrences on the eastern slope of the Ural Mountains and mining operations are now being carried on at several places in this region. Geological surveys made within the last four years indicate that the Soviet Union is rich in bauxite resources and that ample supplies of high-grade ore are available for aluminium reduction. Some rocks described in Soviet literature as bauxite are ferruginous laterite. The principal deposits of bauxite and aluminous laterite in the country are discussed briefly below.

The Oldest Laterites

Referring first to the Tikhvin field. This is situated near the town of Tikhvin, in the northwestern part of European Russia, about 135 miles south-east of Leningrad and 70 miles from the Volkhov aluminium works. The deposits are laterites mostly, but contain some bauxite. They are found as irregular lenses of different sizes. The Tikhvin deposits are unique in respect of age and location, being the oldest laterites known and occurring the farthest north. So far, a series of occurrences has been explored in this field over a strip about 50 miles long extending from north to south. In general the chemical composition varies widely within and among the individual lenses, but while some good bauxite is found in the Tikhvin area the average material as mined is of low-grade. The latter is characterized by a high content of silica, relatively low alumina, moderate water, and a varying content of ferric oxide. Run-of-mine material handled as ore at alumina plants contains about 46 per cent alumina and 12 to 16 per cent silica. As is evident bauxite of this composition is unsuitable for treatment by the Bayer process and other methods have been used in the Soviet Union for extracting alumina from the Tikhvin rock, short descriptions of these methods being given later.

As demanded by the thickness of overburden at the different occurrences both open-cut and underground mines have been worked in the Tikhvin field, where the total reserves of bauxite have been estimated at 8,000,000 tons. This figure includes deposits being mined and occurrences of all grades which have been adequately studied. The alumina plants at the Volkhov and Dnieper aluminium works have been supplied with bauxite from the Tikhvin mines, where the construction of a new alumina plant was begun in 1934.

In 1928 the total reserves of bauxite in the Tikhvin field, excluding the poorest grades of material, were estimated at 1.5 million tons. On account of the unsatisfactory composition and small supply here search for deposits was undertaken at several localities in 1928 and 1929, particularly on the eastern slope of the Ural Mountains, in the Sverdlovsk region. As already mentioned bauxite had previously been found in this part of the country. Low-grade bauxite was discovered near Alapaevsk, about 80 miles to the north of Sverdlovsk, in 1929 and a number of occurrences was later found in this district and investigated. In all cases the deposits were proved to be small and the composition poor, the average material containing approximately 45 per cent alumina and 15 per cent silica. Rock described as bauxite was discovered in the Rezh district, of the Sverdlovsk region, in 1931 and numerous occurrences have subsequently been found. Evidently, however, all the so-called bauxite deposits here are ferruginous laterite with low content of alumina.

In 1932 high-grade bauxite was discovered in the Nadezhdinsk (now called Kabakovsk) district, of the Sverdlovsk region. The largest and best deposit in this field is known as the Krasnaya Shapochka (Little Red Riding Hood). It is situated about two miles east of the village Petropavlovskoe and six miles from the Vagran Station of the Bogoslov-Sosva railway. Most of the bauxite in the Krasnaya Shapochka deposit is red pisolitic rock with an earthy fracture. The average thickness of the main ore-body is about 13-ft. and the variation is from about 1.5-ft. to 30-ft., outcroppings having been traced for nearly 1¼ mile. According to Polutoff (see reference in the appended list) the chemical composition of two bauxites from this deposit was as follows: (1) Pisolitic bauxite: Alumina, 52.05 per cent; silica, 2.64 per cent; ferric oxide, 26.85 per cent; and titania, 0.61 per cent. (2) Earthy bauxite; alumina, 58.26 per cent; silica, 1.26 per cent; ferric oxide, 26.64 per cent, and titania, 1.54 per cent. The average composition of the deposit, representative of ore as mined, is reported to be as follows: Alumina, 56 per cent; silica, 3.7 per cent; and ferric oxide, 26 per cent. Owing to its high quality and uniform composition, as well as to the large quantity already proved, the Krasnaya Shapochka deposit is regarded as one of the best in the world. The supply has recently been estimated at 10,000,000 tons, but it is thought that much more may be found by further exploration. Mining has been started at this deposit and the output was provisionally set at approximately 300,000 tons a year.

Large quantities obtainable

Several bauxite occurrences were discovered in 1933 and 1934 near Bogoslov, in the Kabakovsk district. These lie south of the Krasnaya Shapochka deposit. Bauxite from the Bogoslov field is similar in chemical composition to that of the Krasnaya Shapochka occurrence and it appears that large quantities of good ore can be obtained in the area, but the total reserves have not been determined. Bauxite has also been found recently on the Ivdel River, about five miles from the village of Ivdel, and on the Malaia Taliza River, both in the Kabakovsk district. Preliminary work indicates that the quality is fair, but estimate of the quantity is lacking. Further prospecting is being done in various parts of this district with the expectation that additional deposits will be found.

Numerous occurrences of so-called bauxite have been reported in the Kamensk district, of the Chelyabinsk region, on the eastern slope of the Ural Mountains. For the most part, however, the rocks are ferruginous laterites as shown by chemical analyses. The largest body of laterite in this district lies about 12 miles from the city of Kamensk and is called the Kolchedan-Sokolova occurrence. According to Soviet sources, the average composition of this deposit is as follows: Alumina, 36 per cent; silica, five per cent, and ferric oxide, 36 per cent. Such rock can scarcely be regarded as satisfactory aluminium ore. Similar laterite has also been found near Volkovo and Sapaevo, not far from Kamensk. The indications are that good bauxite has not yet been discovered in this district.

Promising deposits of bauxite have been found lately on the western slope of the Ural Mountains, notably in the Satkinski and Katav-Ivanovski districts, near the Bashkir Autonomous Republic. The best occurrences in this area are reported to be the following: One near the village of Novaia Pristan, about four miles from Suleia Station, on the South Ural railway, in the Satkinski district; another close to Kukshik Station on this railway, in the same district, and the Sapadnosergiievsk occurrence in the Katav-Ivanovski district. In all cases the bauxite appears to compare favorably in chemical composition with that of the Krasnaya Shapochka deposit. Mining has been begun and the output of ore from the two districts was expected to be about 100,000 tons in 1937. Other deposits have recently been discovered in the southern part of the Ural region, including the Kysylsai occurrence, in the Orsk district, and the Perevolotchenk occurrence, in the Chaibullino district. Figures have not been issued as regards the reserves of these latter deposits, but the total amount is thought to be large.

Bauxite occurrences have also been reported at a number of places in the Kazak Autonomous Republic. Several deposits in the Akmolinsk district appear to be the most important of this region. Other occurrences have been found in the Uzbek Republic and in the Kirghiz Republic (domains of Southwestern Asiatic Russia). A large deposit is situated north of Andizhan in the former region and investigation has indicated that the quality is satisfactory. Still other occurrences are known in West and East Siberia, as well as in the Far Eastern Territory, but most of these deposits have not been fully studied and the reserves and industrial value are undetermined.

Table 1 gives a list of the principal bauxite deposits in the Soviet Union, estimates of the quantities available being given in some cases. Small deposits of bauxite and occurrences of ferruginous laterite are not included in the list. The total reserves are estimated at 45,000,000 tons. It seems likely, however, that the total resources of good bauxite will prove to be considerably greater, taking into account various occurrences which have not been adequately investigated and in view of the geological conditions in certain parts of the country. Figures for the output of bauxite in recent years are given in Table 3 (see Statistics, below). Fig. 1 is a map which shows the locations of bauxite deposits, alumina plants, aluminium works, and other points of interest in connection with the aluminium industry of the Soviet Union. The development so far has been mostly in European Russia.

Other Sources of Alumina.—Before occurrences of high-grade bauxite had been discovered in the Ural region the position of the Soviet Union as regards aluminium ore supplies was quite poor and until 1932 it was generally believed that large deposits of good bauxite were not to be found in the country. Apart from the continued search for bauxite, extensive prospecting was carried on over a period of years for deposits of other aluminium-bearing rocks that might be utilized in the preparation of alumina. Numerous occurrences of rocks containing more or less alumina were found and examined. Also, much work was done to develop processes for extracting alumina at low cost from such rocks and from low-grade bauxite. Clays, alunite, nepheline syenite, leucite, coal ash, and other substances were studied in this connection, but except in one special case, involving nepheline, Soviet investigations carried out for the purpose of obtaining alumina from rocks other than bauxite have not led to any industrial application.

TABLE 1.—PRINCIPAL BAUXITE DEPOSITS OF THE SOVIET UNION

Region	*District*	*Deposit at or called*	*Estimated reserves, millions of tons*
Russian, S.F.S.R.	Leningrad	Tikhvin	8
Ural Province	Kabakovsk	Krasnaya Shapochka Bogoslov (and others)	30
	Satkinski	Novaia Pristan Kukshik ..	5
	Katav-Ivanovski	Sapadnosergiievsk ..	—
	Orsk	Kysylai	—
Kazak, A.S.S.R.	Akmolinsk	Various places.. ..	2
Uzbek S.S.R.	Andizhan	Maili-su	—
		Total	45

Considered Plants for Clay

When the second Five-Year plan was being drafted proposals were considered for the construction of several plants in which clays and alunite were to be used in making alumina, but since the various discoveries of high-grade bauxite have been made little has been heard about the application of other mineral deposits as aluminium ore. It is, however, of interest to discuss briefly here the utilization of nepheline concentrates as a source of alumina for the Soviet aluminium industry. Besides, some large deposits of aluminium-bearing rocks other than bauxite are worth mentioning in passing.

Vast deposits of rock containing apatite and nepheline occur at Khibinogorsk, in the Kola Peninsula, Arctic Russia. The reserves have been estimated at several hundred million tons. This rock has been mined and dressed especially to obtain the apatite which is used in producing superphosphate, treatment by flotation yielding apatite concentrates and nepheline tailings. The latter material was formerly discarded. A method has been developed in recent years for preparing alumina from the nepheline residue; soda ash and potassium salts are recovered as by-products. It is stated that the several substances are obtained at low cost. At any rate a plant has been built at Kandalaksha in the Karelia Autonomous Republic for treating nepheline. Construction was started in May, 1934, the productive capacity of this plant being intended to be 20,000 tons of alumina a year. Meantime, it has been reported that alumina made from nepheline has been used at the Volkhov works in the production of aluminium. An aluminium-reduction works is now being built in Karelia and is to be supplied with alumina from the Kandalaksha plant. Good bauxite contains 55-65 per cent alumina, while pure nepheline contains about 33 per cent. The utilization of nepheline as ore is an innovation in the metallurgy of aluminium.

The largest occurrence of alunite in the world is the Zaglik deposit, near the town of Gandzha, in the Azerbaijan Republic. Total reserves have been estimated at 375,000,000 tons of alunite-bearing rock. The content of alunite is reckoned at upwards of 100,000,000 tons. As early as 1916 it was proposed to use the Zaglik alunite as ore for aluminium production. In 1932 an alumina plant with a capacity of 10,000 tons a year was projected for construction at Gandzha in connection with a plan for an aluminium works in the Transcaucasian region. So far, however, alunite has not been worked on an industrial scale as a source of alumina for the Soviet aluminium industry.

More recently an enormous deposit of leucite was discovered in the Armenian Republic. Proposals have been made to utilize this material as aluminium ore and processes of treatment are being investigated.

Large occurrences of clays are numerous in the Soviet Union. The Chasov-Yar deposits in the Ukraine are estimated to contain 400,000,000 tons. Experiments have been carried out at Dnieper aluminium works with the object of developing a process for producing alumina from local clays and thus making unnecessary the long haul of bauxite from Tikhvin. Much work was done over a period of years in trying to extract alumina from the ash of certain coals, especially coal of the Moscow basin and from the Chelyabinsk district of the Ural region. The idea of using coal ash as a source of alumina has evidently been abandoned.

CRYOLITE AND ELECTRODES.—In the past cryolite, carbon electrodes, and alumina have been imported by the Soviet Union in order to cover the requirements of its aluminium industry. Some plants have been constructed and plans made for others so that none of these materials will have to be imported.

Occurrences of cryolite have not been found in the Soviet Union and supplies of the mineral mined at the well-known source in Greenland have been imported from Denmark. One plant for the preparation of synthetic cryolite has been built at Polevskoi, near Sysert Station on the Perm railway, about 38 miles south of Sverdlovsk. The output was originally intended to be about 7,500 tons a year. Since approximately 0.08 ton of cryolite is consumed per ton of aluminium produced, about 6,800 tons of cryolite would be required for output of 85,000 tons of aluminium (as forecast for 1937). Another cryolite plant, with capacity of 1,500 tons a year, was under construction at Gandzha in 1935. It has been reported lately that a third cryolite plant is being erected at Revda, about 28 miles east of Sverdlovsk. In addition, cryolite is to be produced at the Dnieper aluminium works.

One of the essential raw materials used in the preparation of synthetic cryolite is fluorspar and large deposits of this mineral occur in the Soviet Union. Supplies for the Polevskoi cryolite plant were first obtained from the Soyuzplavik fluorspar mines, situated at Junction 86, on the Trans-Baikal railway, in the Chita district of the Far Eastern Territory. The freight haul from the mines to Polevskoi is about 3,100 miles. A good deposit of fluorspar near Amderma, on the coast of the Kara Sea, has been under development during the last few years. Amderma is about 1,400 miles from Leningrad and about 900 miles from Sverdlovsk. A mill has been projected for construction at this deposit. The annual capacity is to be 150,000 tons of concentrates.

Sources of Materials

In addition to fluorspar various other raw materials are used in the preparation of synthetic cryolite. Sulphuric acid, aluminium hydroxide, and sodium carbonate are also required for the process applied at the Polevskoi plant. The sources of these latter materials were originally designated as follows: Sulphuric acid from the chemical works at Kalata, about 54 miles north of Sverdlovsk; aluminium hydroxide from the Volkhov alumina plant; and sodium carbonate from the Berezniki chemical works at Usolskaya Station on the Perm railway, over 400 miles from Polevskoi. The distance from this cryolite plant to the Volkhov aluminium works is about 1,200 miles and to the Dnieper works about 1,500 miles. In the preparation and use of synthetic cryolite as just outlined it is apparent that long freight hauls are involved. Calculation shows that to make one ton of synthetic cryolite at Polevskoi, on the basis given, requires total freightage of more than 7,500 ton-miles. Soviet figures indicate that the cost of producing synthetic cryolite at this plant is about twice as much as the price of natural cryolite, delivered Russian port or border station. Prices for natural cryolite and the synthetic product normally differ little in the major aluminium-producing countries.

Turning now to the question of carbon electrodes and lining material for aluminium cells: Up to 1934 Soviet requirements for these products were supplied by imports. About the middle of that year the manufacture of electrodes was started in a new plant at Kudinovo, near Moscow. This is known as the First Moscow Electrode Factory. Since then, domestic electrodes have replaced the foreign product and home output is now sufficient to cover the needs of Soviet aluminium works. Under the second Five-Year plan another electrode plant was designed for construction at the Dnieper aluminium works. The capacity as initially projected was 17,000 tons of carbon electrodes and 1,400 tons of lining blocks a year, but it was decided later to double the capacity. The output of electrodes was rapidly increased at this plant and in 1936 it was enough to cover all requirements of both the Volkhov and Dnieper aluminium works. The cost of producing carbon electrodes at the Dnieper plant has been figured to be about 160 roubles a metric ton. While the rouble has no exchange value the indications are that the cost is considerably higher in the Soviet Union than in other European countries and in North America.

Petroleum coke is the raw material chiefly used in the manufacture of carbon electrodes for aluminium reduction. It is a by-product of oil refining. Anthracite and pitch coke are also used. Formerly the large petroleum output of the Soviet Union was mostly exported, but during late years numerous cracking plants have been built in the country in order to supply the greatly increased demand for petrol. The principal oil-producing and refining districts are in the vicinity of Baku, in the Azerbaijan Republic, and of Grozny, in the North Caucasus region. Baku is about 850 miles from the Dnieper aluminium works and about 1,200 miles from Moscow. Grozny is about 550 and 900 miles distant from these two places, respectively. The Soviet oil industry has been charged with the responsibility of producing enough petroleum coke for the manufacture of electrodes required by the aluminium works.

ELECTRIC POWER.—The Soviet Union ranks first in water power, possessing about 36 per cent of the known resources in the world, but as yet only about one per cent of the total water power in the country has been developed. The largest hydro-electric station in the Union is at Dneprovsk (formerly called Kichkas), on the Dnieper River, about half-way between Dnepropetrovsk and Zaporozhye, in the Ukraine. Its full capacity is about 550,000 kw. Other large hydro-electric power plants are being constructed or have been projected—notably on the Volga River and at several places in the Caucasus and in Central Asiatic Russia. Numerous regional stations for the generation of electricity from fuel-fired steam plants have been built during the last decade. At present the Soviet Union is one of the leading producers of electrical energy. Data render evident that power-generating stations of the country, both hydro-electric and steam, have been built at unusual expense, so that the cost of electricity is high. Current for three Soviet aluminium works is hydro-electric, but it is generated by a lignite-fired steam plant for the fourth works.

Electric power for aluminium reduction at the Volkhov works is furnished from the Zvanka hydro-electric station, on the Volkhov River. Zvanka is across the river from the aluminium works. Operation of the hydro-electric station was started in 1926 and its full capacity is about 66,000 kw. The cost of producing alternating current at Zvanka is 1.1 kopecks per kw.h. (at the bus-bars of the station), as generally given in Soviet publications, but the cost price after conversion into direct current at the Volkhov aluminium works has been reported to be 1.54 and 2.8 kopecks. In any case these costs are high for current to be used in aluminium reduction. If the nominal exchange value of the kopeck is taken as about ¼d. (½ cent), as often considered, the above costs correspond to about 0.28, 0.39, and 0.7d. per kw.h. (0.56 cent, 0.77 cent, and 1.4 cent) respectively.

Cost of Power Law

The location and capacity of the Dnieper hydro-electric station have been given previously. Power generated here is supplied for various purposes in addition to aluminium reduction and it has been reported that the cost of constructing this station was approximately 220,000,000 roubles. The cost of producing electric current has been variously given, in Soviet journals, as 0.5 kopeck, "less than one kopeck," and one kopeck per kw.h. at the bus-bars. Also, the cost of current at the Dnieper aluminium works, which is close to the hydro-electric station, has been given as 1.2 kopeck per kw.h. Whatever may be the correct rates Soviet engineers seem to agree that the cost of generating current at the Dnieper station is about half as much as at the Zvanka station. Power consumption at the Dnieper aluminium works is much greater than at the Volkhov works. The capacity of the former for aluminium reduction is about three times that of the latter. Moreover electric current is used at the Dnieper works for the production of alumina by thermal smelting and in the manufacture of electrodes, but not at the Volkhov works for these purposes.

As the source of power for the aluminium works at Kamensk, in the Ural Province, a lignite-fired steam plant was projected, designed for capacity of 125,000 kw. Also, an hydro-electric station with a capacity of 360,000 kw. has been planned for construction at Perm. The distance from Perm to Kamensk is about 230 miles. When available electric current generated at Perm may be transmitted to Kamensk. Consideration has also been given to a proposal for a new aluminium works at Perm to be supplied with power from the hydro-electric station. About 60,000 kw. of water power is available near Sosnovetz, in Karelia. This site is the source of current for the new aluminium works being built in the vicinity.

Apart from the electric power-stations already mentioned large hydro-electric projects are being developed, or have been planned for construction, on the Angara River, in the southern part of the East Siberian Territory. A special feature of this river is the regularity of water flow. It is the outlet of Lake Baikal, which serves as a natural storage reservoir. The Angara River is regarded as the potentially largest source of the cheapest power that can be produced in the Soviet Union. Calculations indicate that electricity can be generated at certain sites on the river system for as low as 0.25 kopeck per kw.h. This price may be taken as equivalent to about 0.06d. or 0.13 cent. Proposals have been made to build aluminium works in connection with hydro-electric projects on the Angara River.

ALUMINIUM REDUCTION WORKS.—Primary aluminium has been produced for several years at two Soviet aluminium works. Two other works have been under construction and it was expected that these would be in operation before the end of 1937. Alumina plants are directly connected with three of the four aluminium works, while two other alumina plants are at places not far distant from aluminium works. Table 2 shows the productive capacity for alumina and aluminium at the various establishments as proposed under the first and second Five-Year plans. The figures given also indicate the approximate quantities intended to be produced in 1932 and 1937 (the last years of the respective plans). Actual outputs have fallen far short of the programs. The locations of the various manufactories are shown on the map.

The first Soviet works built for the production of aluminium is situated about 75 miles east of Leningrad, at the Volkhov Station, on the Murman railway and is known as the Volkhov works. Construction was begun in 1930 and partial operation was started in May, 1932. Both the design and erection of this works were supervised, under a technical assistance contract, by engineers of the Cie. de Produits Chimiques et Electrométallurgiques Alais, Froges, et Camargue (France). The establishment includes an alumina plant. Neither carbon electrodes nor synthetic cryolite are produced at the Volkhov works. Bauxite is shipped to the alumina plant from the Tikhvin mines. The aluminium cells are of conventional type with multiple electrodes and operate on 24,000 ampères. Electric current is supplied from the Zvanka hydro-electric station as already mentioned.

Alumina was first produced at the Volkhov plant by a furnace sintering method called the Mueller-Yakovkin process. It is similar to the old Deville-Péchiney process and is described briefly in later paragraphs. The cost of producing alumina here has been reported to be about 348 roubles a metric ton. This is very high, corresponding to about 4d. (eight cents) a pound. The cost of producing aluminium at the Volkhov works has been given as about 2,100 roubles a metric ton. In most countries aluminium costs are approximately one-fourth as much, figured at nominal exchange rates. Also, the Volkhov cost is more than double the "world market price" of aluminium. The total cost of the Volkhov works was estimated at 36.6 million roubles when the initial construction project was prepared. This amount provided for buildings and equipment required in producing 6,000 tons of aluminium and 13,000 tons of alumina a year. The intended capacity for aluminium output was subsequently increased to 12,000 tons a year.

TABLE 2.—INTENDED DEVELOPMENT OF THE ALUMINIUM INDUSTRY IN THE SOVIET UNION

Establishment		*First Five-Year Plan* *Projected output for 1932, in metric tons*		*Second Five-Year Plan* *Projected output for 1937, in metric tons*	
		Alumina	*Aluminium*	*Alumina*	*Aluminium*
Volkhov works	..	13,000	6,000	13,000	12,000
Dnieper works	..	32,000	20,000	32,000	38,000
Kamensk works	..	—	—	70,000	25,000
Kandalaksha plant	..	—	—	20,000	—
Sosnovetz works	..	—	—	—	10,000
Tikhvin plant..	..	—	—	50,000	—
Totals 1932..	..	45,000	26,000	—	—
Totals 1937..	..	—	—	185,000	85,000

Second Aluminium Works

The second aluminium reduction-works built in the Soviet Union is situated at Dneprovsk, in the vicinity of the Dnieper hydro-electric power station, and is called the Dnieper works. Construction was first started in 1930, but then suspended temporarily. Aluminium was first produced here in June, 1933, and alumina in April, 1934. This works was also built under the supervision of engineers employed by the Cie. de Produits Chimiques et Electrométallurgiques Alais, Froges, et Camargue. The following units are combined at the Dnieper works: An alumina and ferro-silicon plant; an aluminium works; a carbon electrode factory, and a cryolite plant. Bauxite has been supplied from the Tikhvin mines, which are more than 1,000 miles distant. Although plans for the Dnieper aluminium works were approved before the one at Volkhov had been designed, construction of the former was delayed and the latter was built first. Installation of equipment at the Dnieper works was still further delayed until experience with aluminium reduction had been gained at the Volkhov works. The aluminium cells are of the same type and size at both works. It has been recently announced that mercury-arc rectifiers are to be installed at the Dnieper works in place of the original rotary converters. The proposed output of carbon electrodes and their cost of production at the Dnieper plant have been previously mentioned. Synthetic cryolite was expected to cost about 800 roubles a metric ton at this plant and the output was intended to be about 7,500 tons a year.

Alumina was first produced at the Dnieper plant by a thermal smelting method known as the Kuznetsov-Zhukovski process. In principle this is analogous to the Pedersen process. A brief description of the Kuznetsov-Zhukovski method is given later. The cost of producing alumina at the Dnieper plant has been given as about 240 roubles a metric ton, which is far too high for economical aluminium reduction. The cost of producing aluminium at the Dnieper works has been reported to be about 1,200 roubles a metric ton, which is considerably lower than at the Volkhov works, but is still about 2½ times the average cost of the world's leading aluminium producers. Total cost of the Dnieper aluminium combine as first planned was estimated at 79,000,000 roubles. The units (buildings and equipment) to have been constructed for this sum included the following: Plant for producing alumina and ferro-silicon, with capacity of 32,000 and 45,000 tons a year, respectively; aluminium works 20,000 tons, and carbon electrode plant, 17,000 tons a year. According to report the actual cost was about 142,000,000 roubles. It has been announced recently that over 200,000,000 roubles have been spent, the additional amount being required for enlargements.

Soon after the discovery of high-grade bauxite deposits in the Ural Province plans were rushed for an aluminium combine at Kamensk, a town about 52 miles east by south of Sverdlovsk. As projected the works was to comprise the following units: Alumina plant, with capacity of 70,000 tons; aluminium works, 25,000 tons, and plant for carbon paste, about 15,000 tons a year. Construction was begun in 1933 and operations were expected to start in 1937. This is the third combination for aluminium production in the Soviet Union and is called the Kamensk works. The total cost of the project has been estimated at 98,000,000 roubles. Since good bauxite with low content of silica is available in the Ural Province the standard Bayer process was chosen for making alumina at the Kamensk plant. The modern type of aluminium cells with covered tops and Söderberg electrodes, operating on 50,000 ampères, has been adopted here. According to Soviet sources the costs of producing alumina and aluminium at this new works will compare favorably with costs of the leading foreign companies. Reference has been made to the lignite-fired steam plant connected with the Kamensk works. It has been reported that this thermal unit may be superseded by a neighboring hydro-electric station proposed for construction on the Yset River.

With the development of a process for recovering alumina from nepheline a plant was projected for erection at Kandalaksha in Karelia. Construction was started in May, 1934, and the intended capacity was 20,000 tons of alumina a year. It was originally proposed to build an aluminium reduction-works at the same place, but a new site at a water-power station near Sosnovetz was subsequently chosen. Sosnovetz is the first station south of Soroka on the Murman (Kirov) railway. Soroka is about 200 miles south of Kandalaksha. The Sosnovetz works was designed for a capacity of 10,000 tons of aluminium a year with provision for enlargement later, the total cost, including a carbon electrode plant, being estimated at 36,000,000 roubles. Raw material for the Kandalaksha alumina plant is nepheline tailings from the dressing of apatite rock mined at Khibinogorsk, in the Kola Peninsula. Alumina for the reduction works is to be supplied from the Kandalaksha plant. Operations were expected to start at both units in 1937.

Finally, construction of an alumina plant near the Tikhvin bauxite mines was begun in November, 1934. The projected capacity was 50,000 tons a year. This plant was built in order to increase the supply of alumina for the Volkhov and Dnieper aluminium works.

Other Plans Abandoned

Plans for numerous other units have been considered during the last decade by Glavalumini (the Central Aluminium Administration), but practically all have now been abandoned. These need not be discussed in the present paper.

Alumina Processes.—The standard Bayer process is not applicable for the treatment of Tikhvin bauxite in the preparation of alumina because the silica content of this rock is too great and during the years from 1925-1930 much work was done in Soviet research institute with the object of developing a process for extracting alumina at low cost from this material. Two processes which are technically sound were ultimately worked out and put into operation. One is the Mueller-Yakovkin method, which is a variation of the Deville-Péchiney (or Le Chatelier-Morin) process. The other is the Kuznetsov-Zhukovski method—a variation of the Pedersen process. As already mentioned the former was originally applied in practice at the Volkhov plant and the latter at the Dnieper plant. In the treatment of Tikhvin bauxite by both processes the cost of producing alumina is remarkably high. When these methods were worked out for practical application no bauxite other than the low-grade rock at Tikhvin was available in the country. In Soviet opinion, however, the development of the two processes made possible the utilization of Tikhvin bauxite and hence the problem of ore for the aluminium industry was at least temporarily solved.

In the Mueller-Yakovkin process the bauxite is first dried at high temperature in a revolving kiln, cooled, and then ground in a ball-mill. The ground material is next mixed with sodium carbonate and calcium carbonate in suitable proportions and the mixture roasted in a revolving kiln to form a sinter. After cooling and grinding the sintered substance is leached with cold water in a mixing tank to dissolve the sodium aluminate produced on roasting. In order to extract the maximum of sodium aluminate from the precipitated (and undissolved) red mud the leaching is repeated several times. The solution is filtered and the red mud discarded. Desilicatization of the aluminate solution is the next step. This operation is carried out with addition of lime in an autoclave under proper conditions of time, temperature, and pressure. A white precipitate of calcium silicate forms and considerable alumina is lost with it. The desilicatized solution is filtered. In order to precipitate aluminium hydroxide this solution is maintained hot in a mixing tank and carbon dioxide is passed. The precipitated hydroxide is filtered from the solution of sodium carbonate formed, alumina being produced by calcination of the hydroxide at high temperature in a revolving kiln. Sodium carbonate is recovered from the filtrate by evaporation and is cyclic in the process. Average extraction of the alumina contained in Tikhvin bauxite is 74 per cent and excluding coal for steam, about six tons of raw materials are used to produce one ton of alumina by the Mueller-Yakovkin process.

The procedure in the Kuznetsov-Zhukovski process as originally devised is as follows : Bauxite is dried and ground and then mixed with barium carbonate, iron borings or iron ore, and coke. Barium sulphate may be added to the mixture. The mixed material is next roasted to form a sinter, barium aluminate being produced in the reaction. The sinter is then mixed with coke and smelted in an electric furnace, compounds of iron, silicon, and titanium being reduced in the operation and a complex ferro-silicon alloy formed. On account of the considerable difference in density of the liquid ferro-silicon and the barium aluminate, separation takes place readily in the furnace, the bottom layer consisting of the alloy and the top layer of the barium aluminate (slag). After the smelting is completed the barium aluminate is tapped into a ladle and poured into blocks, while the ferro-silicon is run from the furnace and cast into pigs. As developed in practice barium sulphate is normally added to the mixture for sintering. The Dwight-Lloyd machine is applied for producing the sinter. Either coke or anthracite is used in the mixture to be sintered and as the reducing agent in smelting.

Alumina Obtaining Process

In the process of obtaining alumina the barium aluminate is first crushed and ground. It is then treated on a magnetic separator to remove admixed particles of ferro-silicon. Next the material is leached in tanks with a dilute solution of sodium aluminate and sodium carbonate maintained at moderate temperature. Sodium aluminate and barium carbonate are formed in the reaction, the latter being precipitated. The solution is then filtered. Treatment of the sediment by leaching follows with filtration of the solution. Barium carbonate is recovered for use again in the process. Desilicatization of the sodium aluminate liquor is not required. Further operations in producing alumina from the sodium aluminate are the same as in the Mueller-Yakovkin process. In practice an average alumina yield of 80 per cent has been obtained from Tikhvin bauxite by the original Kuznetsov-Zhukovski process. The consumption of raw materials is given as up to nine tons per ton of alumina produced. About 1.4 tons of ferro-silicon are made to each ton of alumina and the alloy contains about 20 per cent silicon.

The foregoing process proved unsatisfactory at the Dnieper plant and has been more or less supplanted by the Pedersen process. Calcium carbonate is used in the latter instead of barium carbonate and preliminary sintering is not required as in the Kuznetsov-Zhukovski process. A calcium aluminate slag and pig-iron of low sulphur content are the products of smelting in the Pedersen process. Treatment of the calcium aluminate slag in the preparation of alumina is essentially as described above in the case of barium aluminate. The Pedersen has been operated on an industrial scale in Norway for about ten years.

As mentioned previously the standard Bayer process is used at the Kamensk plant. This method of preparing alumina is well known and details need not be given here. Various processes have been worked out in the Soviet Union for extracting alumina from nepheline, leucite, alunite, clay, etc., but like the Mueller-Yakovkin and Kuznetsov-Zhukovski methods as applied to low-grade bauxite, all these processes are uneconomical. It has been reported that the Arvida smelting process has been tried at both the Volkhov and Dnieper plants.

Statistics.—Table 3 gives some figures for the output of bauxite and aluminium and also imports of primary metal by the Soviet Union in recent years. These data indicate the rapid development of the industry and show that imports have declined as home output has increased. Over the five-year period 1926-1930 the total imports of primary aluminium were about 25,000 metric tons. Moderate quantities of aluminium manufactures have been imported in late years. The Soviet Union does not export aluminium products or the raw metal. Imports of the country in the period 1931-4 were supplied mostly by Norway. In some years considerable quantities have been imported from Germany, Italy, and Canada. Payments for shipments of aluminium to the Soviet Union have been guaranteed in some cases by the governments of the exporting countries and liberal credit terms have been granted. In 1932 the Soviet Union bartered oil for aluminium in a deal with Aluminium, Ltd.

Soviet consumption of aluminium has increased markedly over the last decade and was about ½ lb. per capita in 1936.

TABLE 3.—SOVIET OUTPUT OF BAUXITE AND ALUMINIUM, AND IMPORTS OF ALUMINIUM*

(In Thousands of Metric Tons)

	Output		*Imports*
Year	*Bauxite*	*Aluminium*	*Aluminium*
1913	—	—	1.8
1931	11.6	0.1	20.4
1932	37.4	0.9	10.5
1933	50.6	4.4	10.6
1934	60	14.4	5.1
1935	130	24.5	0.5
1936	200	37.9	0.1

Working-up Industry.—The bulk of aluminium produced in the Soviet Union has been used in the manufacture of aircraft and other armament and of cables for high-voltage transmission lines. Other principal fields of application are in the heavy industries and for various durable goods, among which may be mentioned electrical equipment, motor-cars and lorries, chemical plant, and some kinds of machinery. In the case of wrought manufactures, sheet, tubes, shapes, and wire are produced in both aluminium and its alloys, particularly compositions of the duralumin type, while stampings and drawn wares are also made and sand, die, and permanent-mould castings produced. The Soviet output of aluminium is still insufficient to cover all requirements for industrial purposes, but as increased quantities are turned out from the new reduction works it is the intention of Glavalumini to make metal available for the manufacture of consumers' goods.

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*Figures mostly from Metal Statistics, 1937, Metallgesellschaft A.-G.

Where Products are Made

Aluminium products are manufactured at a rather small number of plants in the Soviet Union. Wire bars are now being cast at the Volkhov and Dnieper works, while aluminium-alloy compositions for both casting and working are produced at both these works. Cable is made at the Northern Cable Plant in Leningrad and various kinds of duralumin manufactures, aluminium sheet, extruded shapes, and other wrought products are made at the Voroshilov plant in Leningrad. About 2,000 men are employed here—the largest duralumin plant in the country. Tubes, stampings, castings, and some other products are manufactured at the Krasny Viborg plant, also in Leningrad, while there is an aluminium sheet rolling-mill in Moscow. Aluminium and alloy specialities required in the assembly of various products are made in departments of manufacturing plants. Numerous branches of the aluminium fabricating industry are as yet undeveloped.

GENERAL DISCUSSION.—As has been shown the primary aluminium industry of the Soviet Union has been expanded very rapidly and the country has become one of the foremost producers within the last few years. This industry was created at great cost, scarcely reflected by the admitted capital expenditures for producing works and auxiliary plants. Its development has been due to Soviet nationalistic policy which justifies extremely uneconomic measures on the basis of self-sufficiency and also for purposes of defence.

Aluminium has undoubtedly not been produced up to now in the Soviet Union at a cost as low as the fixed selling price of the international aluminium cartel (Alliance Aluminium Cie.) and it never can be produced in the country at a reasonable price from low-grade ore worked for alumina by complex and expensive processes, although the situation in respect of costs has been materially changed for the better since the discovery of high-grade bauxite in the Ural Province. Good ore and most of the required raw materials, including coal, can be obtained cheaply in this region. Besides, they can be brought together at a source of hydro-electric power without transport over too great distances.

Beginning Was Discouraging

The Soviet Union was handicapped from the start and faced a discouraging outlook in the creation of its aluminium industry. Among the hindrances were lack of good bauxite, absence of trained technical personnel and skilled operatives, inadequate knowledge of mineral resources, and scanty development of hydro-electric power. Moreover, bureaucratic control of organization and processes, rather than errors of judgment by engineers, was not one of the least obstacles. The most expensive mistake made in establishing the industry was the insistence on using low-grade bauxite ore simply because it could be mined within the country, when high-grade bauxite could be imported at low prices over all-water routes from countries bordering the Mediterranean. As a result, the planning, construction, and operation of the Volkhov and Dnieper alumina plants had to be predicated on processes which were either untried in practice or else considerably more expensive than standard methods.

As suggested alumina can now be produced at low cost in the Ural Province. The initially projected capacities of the alumina plant and the aluminium reduction-works at Kamensk are out of balance since the intended output of the former is considerably in excess of requirements by the latter. Furthermore, it has been reported lately that the original capacity of this plant for alumina output (700,000 tons) is to be increased to 150,000 tons a year. Inasmuch as the capacity of the aluminium works here is 25,000 tons a year the annual surplus of alumina would be about 100,000 tons. This could be used to advantage at other aluminium works. The distance from Kamensk to the Volkhov aluminium works is approximately 1,200 miles and to the Dnieper works is about 1,500 miles. According to report the present intention of Glavalumini is to supply these two works as soon as possible with alumina from the Kamensk plant. This should lead to marked savings in the cost of producing aluminium at both works.

It may be remarked in passing that general conditions have not been favorable to industrialization of the Soviet Union. Development of the aluminium industry has, of course, been affected by these conditions. Some adverse factors are an inadequate railway system, long freight hauls between producing and consuming centers, low density of population, and the agrarian character of the inhabitants. Whether the political organization of the country will prove to be beneficial over the long term remains to be seen.

There has been some concern in foreign aluminium-producing countries that the Soviet Union, in view of its increasing output, might undertake to dump primary metal on the world market. This seems unlikely, for the present at any rate, because home demand is considerably greater than the supply. Also the discernible output for some time to come will be needed within the country, while, moreover, production costs of Soviet aluminium will continue to be rather high for some years. Finally the country produces commodities—for example, wheat and petroleum—which can be sold or bartered abroad at much greater profit than aluminium.

Communications in Manchuria

THE total expenditure for new enterprises of the Manchuria Telephone and Telegraph Company is Y.8,035,000, indicating a decrease from the previous year's amount by about one million yen. This decline, it is understood, is due to governmental fund control and the shortage of materials under the current situation, and the postponement of these enterprises which are not urgently needed.

Of the total, Y.4,000,000 will be financed by debentures, to be issued and underwritten by the Bank of Chosen; Y.2,000,000 from its reserve fund, while the remainder will be raised by other measures.

The total expenditure will be divided into Y.600,000 for telegraph equipment, Y.5,400,000 for telephone equipment, Y.500,000 for radio equipment, Y.500,000 for others, and Y.1,000,000 as a fund in reserve.

Among telegraphic enterprises will be the erection of 53 telegraph offices, the establishment and extension of telegraphic lines, the repair of lines between Harbin and Mutankiang and other places, the re-enforcement of wireless apparatus, including equipment for a 20 kilowatt transmitter, and the reinforcement of communication apparatus for North China. Among the last mentioned will be the erection of one kilowatt wireless transmitter each at Hsinking and Tientsin, and the improvement of cable apparatus between Mukden and Tientsin to meet the rising need for communications between Manchuria and North China and between Japan and North China, since communications between the latter territories are now being relayed from Manchuria. The number of cable communications between Manchuria and North China has been doubled since they were transmitted via Manchuria.

The improvement of apparatus in Japan is also being considered to meet the increase of cables within the country to connect with those in Japan.

Among the telephonic enterprises will be the erection of 23 offices, 12 telephone exchange offices, to accommodate the increase of telephone subscribers numbering 5,500 and telephone lines; the amalgamation of telephone companies now under private management, the alteration to the automatic system at Chiamussu, Antung and other towns, and the improvement of apparatus in Harbin.

Radio enterprises will include the erection of new broadcasting stations in Chiamussu, Yenki, and Tsitsihar, all of which will be opened from April 1, with 500 watt, 200 matt and 50 watt transmitters respectively, and the erection of a 10 kilowatts short-wave transmitter in Hsinking.

Cork Manufacturing in Japan

(From the Japan Exporter)

THE cork manufacturing industry was initiated in Japan about 1871-2. In those days, however, the industry was in an extremely primitive stage, as manufacturers used to collect corks of empty beer and wine bottles here and there, and made corks for phials, bottles, etc., out of them by hand. By the middle of the Meiji era (1868-1912) the production of beer and wine had steadily developed in Japan and incidental to the increase in demand for stoppers and rings, some enterprising industrialists started to import half manufactured stoppers and rings and to finish them in Japan. Subsequently a whittling machine was devised in this country and superior quality articles are now being made.

Since the end of the Meiji era (1868-1912) compressed cork boards have been imported in large quantities, and at an early date this trade was the subject of intensive study on the part of industrialists. Recently the production of carbonized cork boards has been completed, and this has reduced the amount of import of boards for insulation or temperature maintenance purposes a great deal. A remarkable advance has also been made in the production of disks for crown cork and the same is in every way equal to the imported item. This remark likewise applies to rings and the packing material for machines, etc.

The material for the production of cork manufactures is being imported from Portugal, Spain, Algeria, etc., since the bark of a tree called "Abe Maki" found in Hiroshima prefecture and in Chosen, which can be used as the material, being thin in depth and small in output, is not suitable for all purposes as is the imported material.

Imports of Cork Industry

Stoppers and rings had been the largest items in the list of imports for cork manufactures. In 1919-1920 the annual amount of imports reached nearly one million yen. The steady advance of the industry in Japan, however, reduced imports by degrees, and in 1934 the amount was only eighteen thousand yen. The same remark applies to the boards, and what boards are being imported to-day are of exceptionally high quality or for the manufacturing of stoppers for bottles containing toilet articles. These are imported from England, U.S.A., Germany, Spain, Portugal, and Holland.

CORK MANUFACTURES

Year	*Quantity (Kgm)*	*Amount (Yen)*
1930	—	287,688
1931	—	101,507
1932	—	90,956
1933 (bark)	4,028	19,049
1934	5,453	18,044
1935	5,775	18,606
1936	5,828	19,545

CORK STOPPERS AND RINGS CLASSIFIED BY COUNTRIES (1934)

Countries	*Quantity (Kgm)*	*Amount (Yen)*
England	163	272
France	197	328
Germany	3	22
Italy	4	15
Holland	8	32
Spain	30	15
Portugal	810	2,129
U.S.A.	4,285	12,364

Where they are Exported

Some quantities of stoppers and boards are being exported to the Chinese Republic and Manchoukuo but the volume is negligible as yet.

Cork manufacturing industries are carried on to-day in the prefectures of Tokyo, Osaka, Hiroshima, Niigata, Hyogo and Okayama. The manufacturing of bottle stoppers is generally conducted on a very small scale and is yet within the range of household industry, as hand operated whittling machines are used. The manufacturing of disks for crown corks requires a complete installation of shearing equipment, experienced technique, selection of quality raw material and other attendant difficulties. As such this item is being manufactured at well equipped and large scaled plants. Regarding the manufacturing of compressed boards, these are made by pulverising cork wastes or poor quality cork bark, compressing them by mixing an adhesive compound, or carbonizing them, and as the process and equipment are entirely different from cork manufactures in general, manufacturers in this line generally engage in some other similar industries.

The following are some of the principal makers in this line in Japan: Tokyo Cork G.K., Tokyo Cork Kyogyo K. K., Nagayanagi Shoten, Tokyo Cork Plant, Nippon Cork K.K., Tokyo; Osaka Cork Kogyo G.K., Dobashi Cork Plant, Ashida Gisaburo, Kita Cork Seisakusho, Kamada Sutezo Works, Osaka; Taka Wooden Stopper Works, Taka, Hyogo-ken; Uchiyama Shintaro, Okayama; Toyo Kogyo K.K., Taiyo Cork Kogyosho, Hiroshima-ken.

The following are some of the foreign makers, whose manufactures are being imported into this country: Estva & Messer S.A., Spain; Simon Evers & Co., Germany; Armstrong Cork Co., Robinson Co., New England Fiber Blanket Co., Dewey & Almy Chemical Co., U.S.A.; National Cork Industrial Ltd., England.

In view of the technical simplicity in the manufacturing of cork products, those which are made of imported materials are invariably equal to foreign makes. This is especially true with compressed boards, where the fineness and the uniformity of the cork granule are in every way equal to the imported item.

Price Comparison

Although a definite line of demarcation cannot be drawn because of the varying brands and other factors involved, the following percentages on the basis of mint par of exchange are considered to be not far off the mark: German manufactures about 15 per cent higher than home products, the American about 35 per cent higher, and the British approximately the same.

At any rate it is a decided disadvantage against Japanese industrialists in this line that this country does not produce any superior quality cork material, the only point in her favor being the low wages involved.

The Philippines—Its Richness in Gold

(Continued from page 190)

common, P.8,000 on preferred; Syndicate Investments, P.7,500 on common and P.45,000 on preferred.

Monthly Gold Production, 1937

	Tons treated	*Value*
January	218,594	P.4,153,587
February	201,899	3,685,707
March	209,072	4,089,590
April	212,290	3,972,372
May	217,866	4,276,366
June	223,166	4,290,378
July	229,638	4,133,413
August	241,017	4,262,967
September	251,489	4,514,810
October	250,730	4,685,189
November	246,119	4,614,991
December (estimated)	250,000	4,650,000
Totals	2,751,880	51,329,370

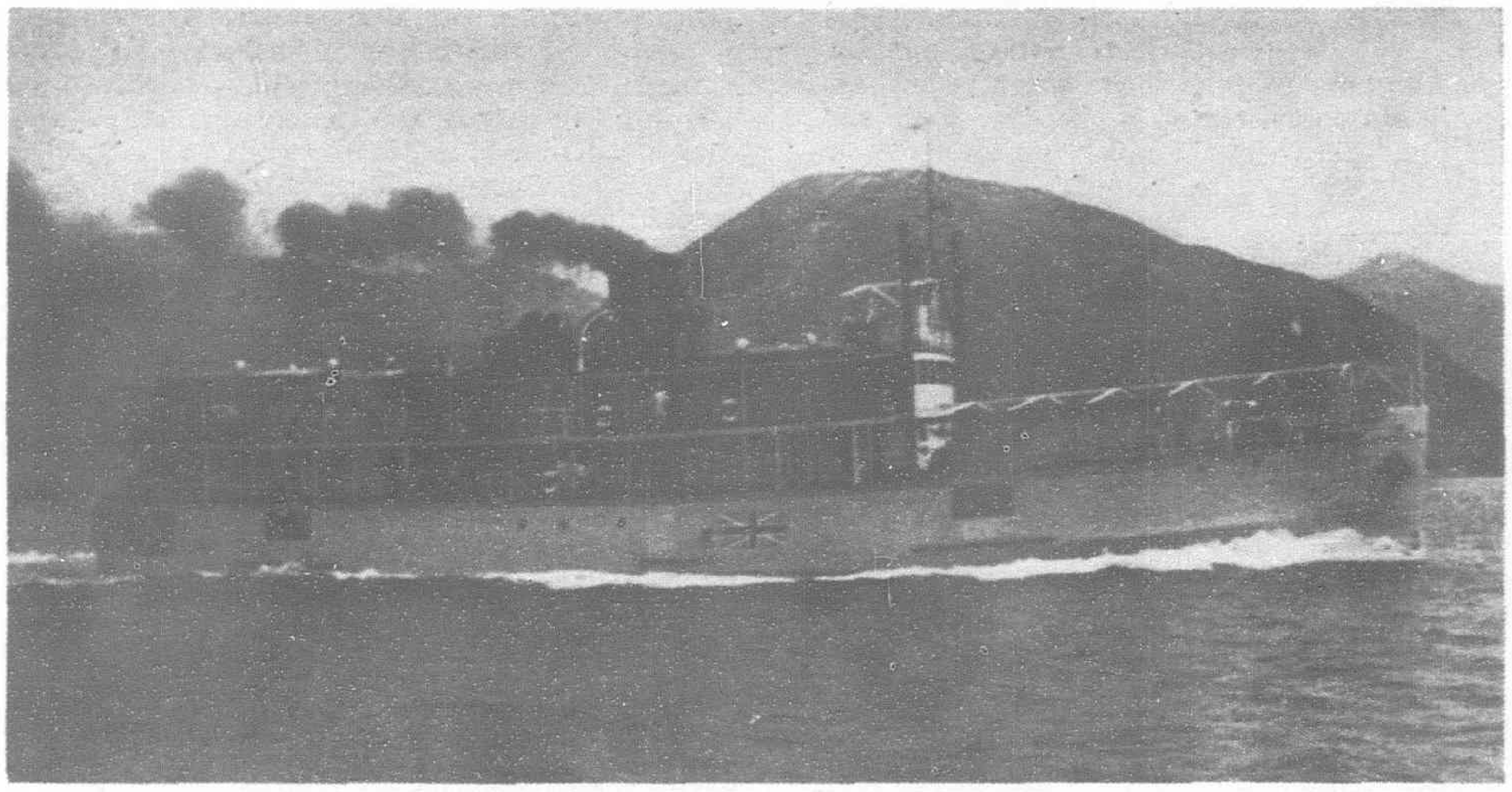
Tonnage figures are for lode properties only. Gold output from two small placer operations and one tailings operation are included in Value figures. All figures preliminary estimates.

A New Modern Ship for the Yangtze River

THE T.S.S. *Li Wo*, recently launched at Hongkong, was designed as a passenger and cargo vessel for service between Ichang and Chungking on the Yangtze River and to operate mainly in the winter which is the low water season. The ship has a length of 164 feet, nine inches; breadth moulded, 30 feet; depth moulded, nine feet; and load draft, seven feet, six inches. The ship was constructed by the Hongkong & Whampoa Dock Co., Ltd.

The hull is of special scantlings classed Lloyds A.1. special survey "For Service on the Yangtze River." In addition to the usual dry cargo spaces provision has been made for the carriage of about 200 tons of oil in three separate tanks, two forward and one aft. A hundred ton per hour capacity pump has been installed for rapid handling of the oil cargo. Two steam driven capstans of special design are fitted on the fore deck. These have dual duties, firstly for lifting anchors and cables and secondly, in case of necessity, for warping over rapids.

The guaranteed speed in 12½ knots loaded but with the margin of power provided the vessel may be able to negotiate the worst rapids without the assistance of shore wires. Three rudders are fitted as usual for Yangtze ships of this type and the two propellers are driven by triple expansion engines with steam supplied by two water-tube small tube Yarrow boilers arranged for burning coal with forced draught, two steam driven fans being installed for this purpose. The whole of the crew are accommodated in houses on the upper deck with the exception of the sailors who are arranged for in the forecastle.



T.S.S. "Li Wo," steel twin-screw river steamer built and engined by the Hongkong & Whampoa Dock Co., Ltd., for the Indo-China Steam Navigation Co., Ltd. The ship is for the Yangtze run

Special Heat Lining

The Bridge deck has cabins for ships officers at the fore end and passenger staterooms and saloon aft with bathrooms, etc., amidships. The wheelhouse is at the fore end of this deck and is totally enclosed with bullet proof steel for protection in case of attack from the banks of the river or elsewhere. Owing to the intense heat and cold experienced on the river special provision has been made throughout the accommodation for the comfort of passengers and crew, the outsides of all deckhouses are lined with special heat and cold resisting material.

All the accommodation throughout the vessel is steam heated. Electric lighting is fitted throughout, current being supplied by a steam driven generator. There is also a standby diesel driven generator for use when steam is not available.

Staterooms, saloon and officers cabins are fitted with electric fans, also mosquito screening to all doors and windows. Wood sun protection is also fitted over this accommodation. There are six double staterooms with two beds and two wash basins in each with hot and cold running water also dressing chest, bed, reading lamps, etc. These cabins are panelled in oak with parquetry flooring. Over the wheelhouse is arranged a passenger observation position from where an unobstructed view forward is obtained.

High power, shallow-draft (on a paying load) and extreme handiness are essential features, while definite limits of length are set by reason of the sharpness of some of the bends. Some facts concerning the part of the river on which the vessel is to operate may be of interest.

Navigation Difficult

The stretch of river between Ichang and Chungking some 1,400 miles inland, involves extraordinary difficulties to navigation. The fall of the river between these two places is no less than 476-ft. in the distance of 400 miles, or an average gradient of over 14 inches a mile. Owing to this fall, and also because the river is confined in narrow gorges, there are some 35 rapids, where the current at times exceeds six knots. At the most difficult of these rapids, the current may attain the high rate of 13 knots.

The rapids vary very greatly with the height of the river, some becoming more easy and others more difficult to negotiate with a fall in level. This is because some rapids are caused by obstructions at the sides of the river and others by obstructions in its bed. The former are improved by a low river, and the latter are worse. In fact, this stretch of river, with its rapids, shallows, abrupt bends, eddies and submerged rocks, was regarded as unnavigable by power driven vessels until Captain Plant demonstrated that specially designed ships of the type of the *Li Wo* could be operated successfully. The Chinese Maritime Customs are improving the river, and as a result of these improvements it has been possible to make the *Li Wo* slightly longer than her forerunners, with a consequent saving in power for a given speed while retaining other necessary characteristics for this exacting service.

Can Dredging be of Use in the Regulation and Maintenance of North China Rivers?

(Continued from page 192)

the delta will be frequent. In the middle of the delta it is common for the river to have numerous, shallow channels which again unite to form one or two channels which carry the flow to the sea. Or there may be a flooded area in the middle of the delta with one or two channels carrying off the flow. But at other times there is a single, good channel the whole way through to the sea. When this is the case the upstream channel is also in good condition. It seems natural that this should be so. When the middle of the delta is flooded, or has numerous inefficient channels, much silting takes place there and this again affects the upstream channel. When there is a single channel through to the sea the river tries to deepen its channel where there is a hump in the profile caused by the transition from a flat to a steep slope. The inference is therefore that every effort should be made to keep the river in as good a condition as possible through the greater part of the delta so as to depress the channel bed in the transition stage between the flat and the steep slopes. Dredges may therefore be utilized for encouraging the river to flow in as few channels as feasible through the greater part of the delta. That is, the silt deposition should be made to take place as close to the sea coast as possible and preferably in the sea itself as the littoral currents will then help much in distributing the silt masses along the coast line instead of having them deposited in relatively small areas in the middle of the delta thus creating a highly unstable delta condition.

Engineering Notes

INDUSTRIAL

POWER PLANT CEASES.—The power plant of the Mutual Benefit Society, an organ of the Japanese Municipal Concession in Tientsin, has ceased to produce electrical power, since the electricity required in the Japanese Concession is now supplied by the new Tientsin Power Company located in the 3rd Special Area.

MERGE ELECTRIC FIRMS.—As the first step for controlling electric enterprises in North China, which are closely related to the light and heavy industrials in this territory, the Provisional Government of the Republic of China, desiring to develop electric enterprises in co-operation with various concerns interested, has decided to merge minor electric firms under the jurisdiction of the former East Hopei Anti-Communist Autonomous Government with the East Hopei Electric Company.

COTTON WITHOUT FIBER.—The Manchoukuo Department of Industry has reached an agreement with the Kwantung Bureau that the Manchoukuo Government will not force the cotton spinning mills in Manchoukuo to mix staple fiber with cotton, as asked by the Japanese Department of Commerce and Industry. The latter called upon the Manchoukuo Government and the Kwantung Bureau to follow the same policy as in Japan and Chosen, where a mixture of 30 per cent of staple fiber with cotton is required from all spinning mills, excepting for cotton textiles to be exported abroad. Raw cotton imports to Japan are now restricted.

SELECT FUEL PLANT SITE.—Regarding the change of site for the projected coal liquefaction plant of the Manchou Compound Fuel Company, the Manchoukuo Department of Industry has issued a statement, which reads: "Although the Manchoukuo Government announced a plan to establish a coal liquefaction plant on an area near the Haichow station on the Hsinlitun-Ihsien line, later technical investigations proved that the selected area is not suitable for producing a large amount of liquid fuel, because of its shortage of water, which is vitally important in washing and refrigerating gas to be mixed with liquid fuel. Therefore, the Government has selected Chinchow as a suitable position for erecting the plant, as water is plentiful there, and has cancelled the previous plan for establishing the plant at Haichow, even though that place is nearer to coal mines."

STEEL PRODUCTION PLANS.—As the industrial situation in Japan and Manchoukuo has been altered by the outbreak of the China Incident, new plans for producing 11 million tons of steel by the end of 1941 in Japan, Manchoukuo and China were drafted by the Japanese Government as a result of careful consideration among the Department of Commerce and Industry, the Manchurian Affairs Bureau and the Planning Board. The new proposals form a revision of the plan drafted by Admiral Takuo Godo, then Minister of Commerce and Industry in the Hayashi Cabinet, for producing 10 million tons of steel materials for the fiscal year of 1941. Pig-iron production required for carrying out the plans is estimated at 12.5 million tons for Japan, Manchoukuo and China, including pig-iron for casting, of which about 1.2 or 1.3 million tons of pig-iron will be produced in China and the remaining amount in Japan and Manchoukuo. Pig-iron production in Japan and Chosen is estimated at about seven million tons, and for Manchoukuo about 4.5 million tons.

MINING

KANGTE TO START MINING.—Preparations completed by the end of March for the establishment of the Kangte Iron Mine Development Company jointly by the Manchoukuo Government and Mr. Keitoku Kamishima, president of the Tahua Metallurgical Company in Dairen. The projected company's capital, about which negotiations are under way between the Planning Bureau of the General Affairs Board, the Manchoukuo Government, and Mr. Kamishima, is expected to be fixed at three million yuan fully paid up, of which one million yuan will be invested by Mr. Kamishima and the remaining two million yuan by the Manchoukuo Government.

IRON, STEEL DEVELOPMENT.—Plans for developing the iron and steel output in North China will shortly be materialized after the Government bill for establishing the North China Development Company is approved. According to the Japanese Government's plan, a huge corporation will be established under the control of the North China Development Company to undertake iron and coal mining and iron manufacturing whose capital may be subscribed to by iron and steel manufacturing companies in Japan. The projected company will be managed by the Nippon Iron Works and a few private concerns interested. In this connection, Mr. S. Nakamatsu, managing director of the Nippon Iron Works, was sent to North China to make a field investigation of the natural resources there.

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